ABSTRACT

Investigation of Safety Culture Among Youth Workers

by

Moien Kiani

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Director of Thesis: Michael G. Behm, PhD., CSP

Major Department: Technology Systems

According to the Occupational Safety and Health Administration (OSHA), young workers whose ages range from 14 to 24 and are interested in finding different jobs during the summer or during the school year are considered at great risk of occupational injuries and accidents. This is due to their lack of experience and the nature of their developmental stages in different aspects such as emotion, cognition and physical features. Notably, the number of workers under the age of 24 is considerable and thus, the safety and health of these workers will be important. For instance, in 2016, NIOSH reported that approximately 19.3 million workers were under the age of 24 in the United States and represented 13% of the workforce. The vulnerability of such workers could also be due to a lower level of maturity, work related safety and health training, skills, perception of safety and occupational risks, and typically higher level of work speed and work load compared to the older workers. This could be the reason they are at high risk of work related injuries and diseases. The International Labor Organization (ILO) considers one of the possible factors that could generally create risk inequality among workers is organizational culture; Safety culture is a particular part of organizational culture considering

shared beliefs, values and attitudes in organizations that could be a contributory factor in safe operations.

Purpose of Study/Participants/Research Method

Three important points should be considered in safety among youth workers

1. Informing young workers about their rights
2. Reducing their lack of knowledge regarding safety
3. Reducing their hesitation in talking about safety issues at work.

Moreover, there is an importance regarding some safety culture factors in the study of young workers because such factors exert considerable influence on young workers safety and health at work. By reason of this, four safety culture factors were selected as follows: management commitment, safety involvement, safety communication, and work environment. The purpose of this research is to survey students within the College of Engineering and Technology at East Carolina University who are currently working or have previously worked during the summer. The descriptive analytical survey-based research utilizing the descriptive statistics and the statistical tests (SPSS Software) will be applied to observe how safety culture factors correlate with each other in the study of young workers, how safety culture and its structural factors correlate with demographic variable, and to evaluate how youth workers perceive safety culture and its structural factors.

Investigation of Safety Culture Among Youth Workers

A Thesis

Presented to the Faculty of the Department of Technology Systems

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Occupational Safety

by

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APPROVED BY:

COMMITTEE CHAIR	Michael G. Behm, PhD, CSP
COMMITTEE MEMBER	Dylan C. Hardison, PhD
COMMITTEE MEMBER	Merwan B. Mehta, PhD
CHAIR OF DEPARTMENT OF TECHNOLOGY SYSTEMS	Tijjani Mohammed, PhD
DEAN OF THE GRADUATE SCHOOL	Paul J. Gemperline, PhD

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I would like to thank my family who supported me in every stage of my life and my wife who did her best to provide a condition for me to finish my thesis. Certainly, without her help and support of my family, I would not have been able to finalize this thesis. I would also like to thank my advisor, Dr. Michael Behm, who guided me well in the preparation and pursuit of this research. I wish to also thank to Dr. Merwan Mehta and Dr. Dylan Hardison for accepting to serve on my thesis committee, for their time, and for their sincere attention to review my thesis. I would like to thank all faculty members, students, and friends who sincerely helped me in this research. Certainly, the main purpose of this study is to serve people as I have always had this goal during my twelve years of being in the field of safety and health.

Finally, I hope the results of this research familiarize young workers with their rights regarding safety and health and give them a voice to talk about their safety issues at work. Moreover, I hope this research paves the way for future studies regarding the safety and health of young workers.

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INTRODUCTION

Today, safety is considered to be one of the most crucial elements in the general management of every organization. Hence, minimizing the different occupational risks and the prevention of work-related accidents, injuries and illnesses are indispensably considered by the employers to create suitable work-related conditions for workers (Rodrigues et al., 2014). However, it is abundantly clear that no matter if a system is engineered with a careful consideration, no matter how carefully employees exercise their responsibilities, and no matter if employees are trained perfectly in the recognition and prevention of hazards; accidents still happen (Cadick et al., 2006). Accordingly, work-related accidents and diseases are still considered as a human tragedy (Stellman, 1998). It is notably remarkable because about 58% of world's population spends almost 33% of their adulthood at work (Shalini, 2009). Globally, approximately 264 million work-related accidents and 350,000 fatalities occur annually (Rahmani et al., 2013). Such accidents can be associated with significant economic setbacks and social issues for the companies, societies and countries along with imposing financial burdens and human loss on employees and their families (ILO, 2014).

Financial Aspects of the Occupational Accidents

The financial burdens due to work-related accidents can be in the form of direct and indirect costs. It is noteworthy to mention that normally the indirect costs are much more considerable in comparison with direct costs (Hämäläinen et al., 2006). According to the Occupational Safety and Health Administration (OSHA) direct costs can be exemplified in "workers' compensation payments, medical expenses, and costs for legal services". On the other hand, indirect costs can be embodied in "training replacement employees, accident investigation and implementation of corrective measures, lost productivity, repairs of damaged equipment and

property" and furthermore the related "costs to the lower employee morale and absenteeism" (OSHA, 2018a). There might be a variety of ideas in relation to the proportion of the indirect costs to the total costs in comparison with direct costs. However, based on the OSHA's Safety Pays Program, the estimated indirect costs of work-related accidents and illnesses are considered almost 10 % more if the direct costs are $10,000 or more (Indirect Cost = Direct Cost * 1.1). Table 1 demonstrates the possible scale of direct and indirect costs according to the safety pays program of OSHA.

Table 1. Possible scale of direct and indirect costs according to the safety pays program of OSHA (OSHA, 2018b).

Direct Costs	Indirect Cost Ratio
$0 - $2,999	4.5
$3,000 - $4,999	1.6
$5,000 - $9,999	1.2
$10,000 or more	1.1

Moreover, considering the 10 % scale (for the direct costs of $10,000 or more), such costs include approximately 52 % of the total costs of the occupational accidents and diseases (Total Costs= Direct Costs + Indirect Costs) (OSHA, 2018b). Figure 1 indicates the total costs of work injuries and diseases considering related costs to the employers, workers and community.

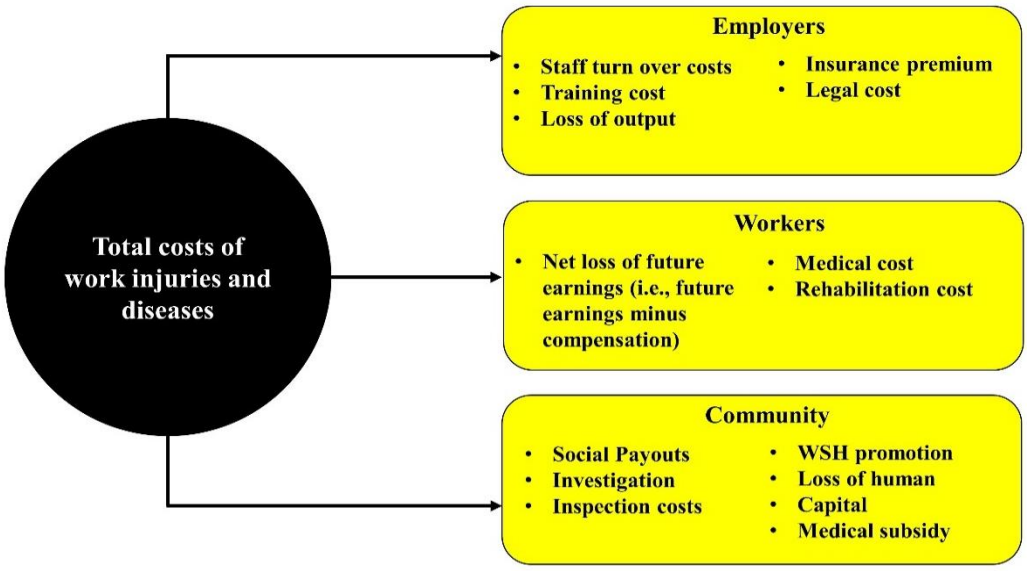

Figure 1. Total costs of work injuries and diseases (Takala et al., 2014)

In general, total costs of occupational accidents based on the estimation of International Labor Organization (ILO) equate to approximately 4% of gross national product (GNP). As an example, yearly costs of occupational accidents and diseases in 2003, which is approximately $1.36*10^{12}$ USD can perfectly represent the significant economic loss owing to the such accidents and illnesses if global GNP is considered almost $34*10^{12}$ USD in that year (Hämäläinen et al.,2009). The high costs of work-related accidents and illnesses can be also exemplified in the European Union (EU) that annually about 2.6%-3.8 % of shared EU GNP is lost due to the 4.6 million yearly work related accidents. Occupational accidents and illnesses imposed financial burdens in Australia that equaled to approximately 5.9% of gross domestic product (GDP) within the years of 2005 and 2006. These financial burdens were approximately 4.8% of GDP between 2008 and 2009 in Australia. Similarly, in the United States there is a financial loss of almost $170 billion each year owing to the occupational accidents and injuries (Rikhardsson et al., 2004; Takala et al., 2014; Frazier et al., 2013).

Detailed Statistics for Young Workers

As mentioned before, millions of occupational accidents occur each year worldwide. Such accidents have been found to be noticeably abundant in the United States. This can be exemplified in the 5,190 and 4,836 recorded fatal work-related accidents in 2016 and 2015 respectively (BLS, 2018). Among all workforces, the number of young workers under the age of 24 and their fatality rate are considerably significant. As an example, it is notable to mention that approximately 19.3 million workers were under the age of 24 in 2016 and they represented 13% of the workforce in general. Likewise, during the years of 2010 to 2015 in the United States there was a growth in number of employed young workers (between the age of 16 and 24) reaching more than 14 million full-time equivalents (FTEs). Figure 2 indicates the numbers of these young workers between the years 2000 and 2015. Typically the data is presented by means of FTEs instead of number intended for pointing out the part time aspect of the work for the majority of young workers (NIOSH, 2017a).

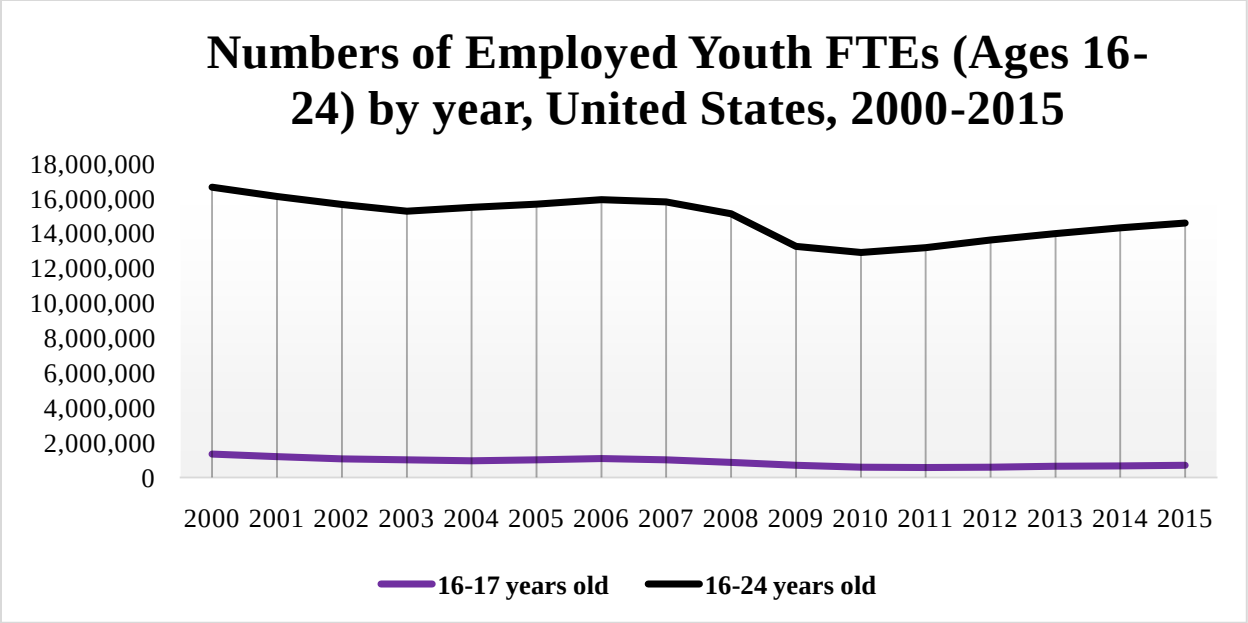

Figure 2. Numbers of employed youth FTEs (Ages 16-24) by year, US, 2000-2015 (NIOSH, 2017b)

In 2015 in the United States, 403 fatal occupational cases were reported for young workers under the age of 24 with 24 of those victims being under the age of 18 (NIOSH, 2017a). Considering the total number of fatal occupational accidents in 2015, approximately 8 % of them were related to the young workers. It is also important to mention that the rate of non-fatal injuries among young workers was 110.5 per 10000 FTEs for the ages of 16 to 19 in 2015. This rate was 98.3 per 10000 FTEs between the ages of 20 and 24. Moreover, young workers between the ages of 15 and 19 had a higher rate of treated occupational accidents in the emergency department, which was 2.18 times more in comparison with workers with the ages of 25 and older in 2014. This rate was 1.76 times more for the ages of 20 to 24 relatively (NIOSH, 2017a). Figures 3 and 4 demonstrate the rate of fatal work injuries per 100000 FTEs considering the age groups from the year 2012 to 2016. As it can be seen in the Figure 3 the rate of fatal work injuries in the first age group (18 to 19) is reduced from 2.9 in 2012 to 1.9 in 2016. However, the

age group of 20 to 24 years old during these years experienced different rates of fatal occupational injuries and the final rate of 2.4 in 2016 is not changed in comparison with the final rate in 2012. The mentioned age groups (specifically 20 to 24) are noteworthy because the rates of fatal occupational incidents in various years among them are slightly different from the older age groups. Notably, in some years these rates are higher. For example, the age group of 20 to 24 years old has the rate of 2.7 in 2015 which is more than the age group of 25 to 34 years old in the same year. Hence, the first two age groups (18 to 19 years old and 20 to 24 years old) are indispensable to be paid more attention and this study has focused on them as the target population.

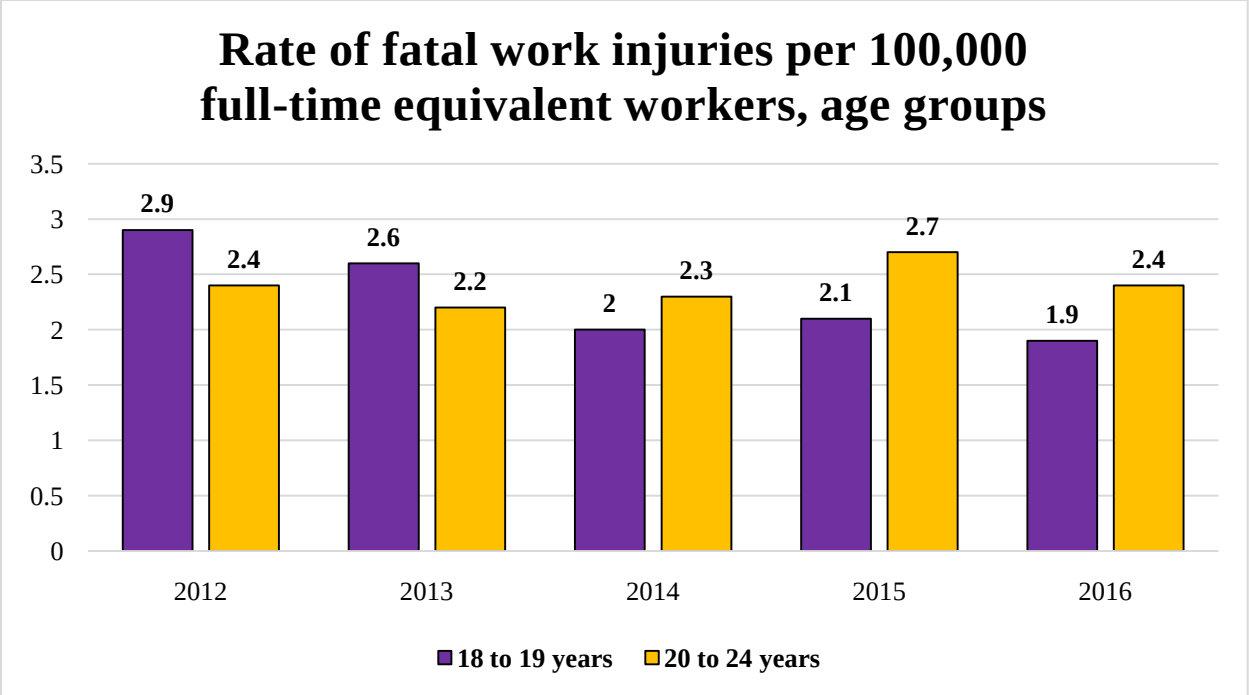

Figure 3. Rate of fatal work injuries per 100,000 full-time equivalent workers by age group (BLS, 2017a)

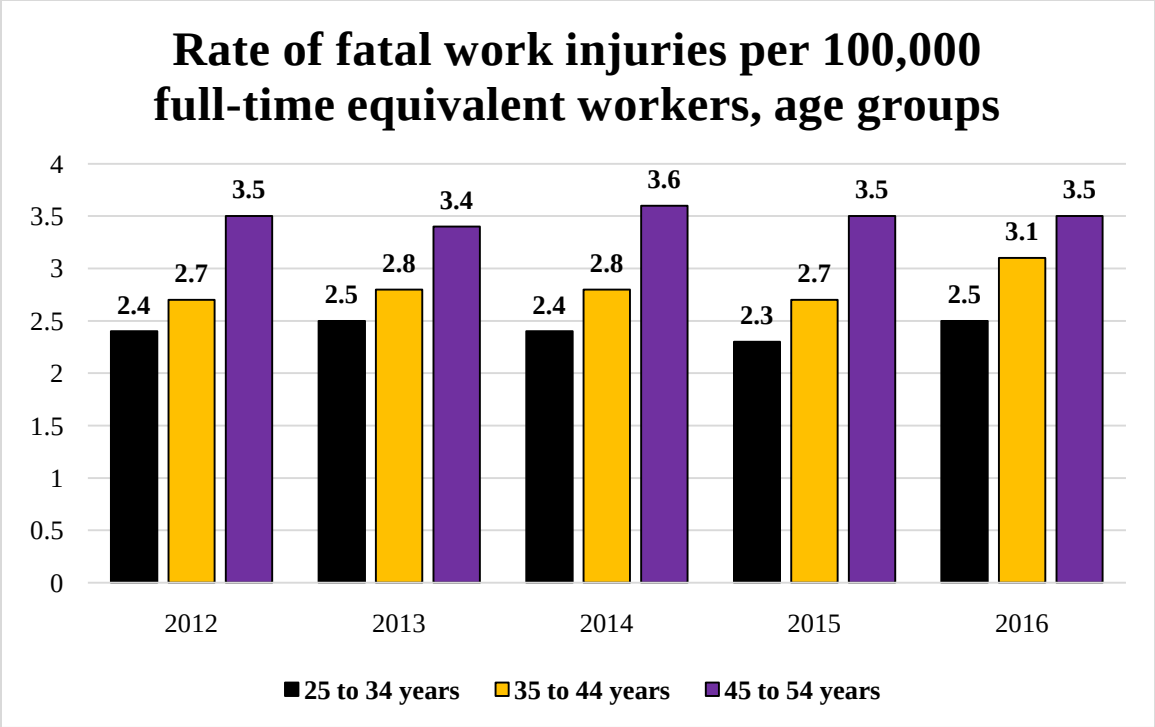

Figure 4. Rate of fatal work injuries per 100,000 full-time equivalent workers by age group (BLS, 2017a)

Figure 5 indicates the fatal occupational injury rate (by age group) for 2016 associated with more details regarding the recent statistics by the Bureau of Labor Statistics (BLS). A small in-depth analysis can demonstrate that the rate of 2.1, 1.9 and 2.4 per 100,000 FTEs for the first three age groups respectively are considerable when 13% of the workforce was under the age of 24 in 2016 (NIOSH, 2017a).Therefore, these rates for the first three age groups individually or collectively are high enough to require more attention when compared with other age groups. Significantly, all three rates in 2016 are more than 50 % of the rate 3.6 which is all-worker fatal occupational injury rate. Moreover, it is remarkable to mention that by drawing a comparison between the number of fatally injured workers under the age of 24 years old and the rest of age groups in 2016 following similar result could be obtained for North Carolina State as an example (Figure 6). There are 20 fatal injuries for workers under 24 years old (including 19 cases for the

ages 20-24 and 1 case for the ages 16 -17) among 174 cases of fatal work-related incidents which is approximately 11 percent of the total. Hence, compared to the fatal occupational injury numbers for other age groups such as 25-34 and 35-44 which are almost 13 and 21 percent of the total respectively, above mentioned percentage (11 percent) can be considerable (BLS, 2017c).

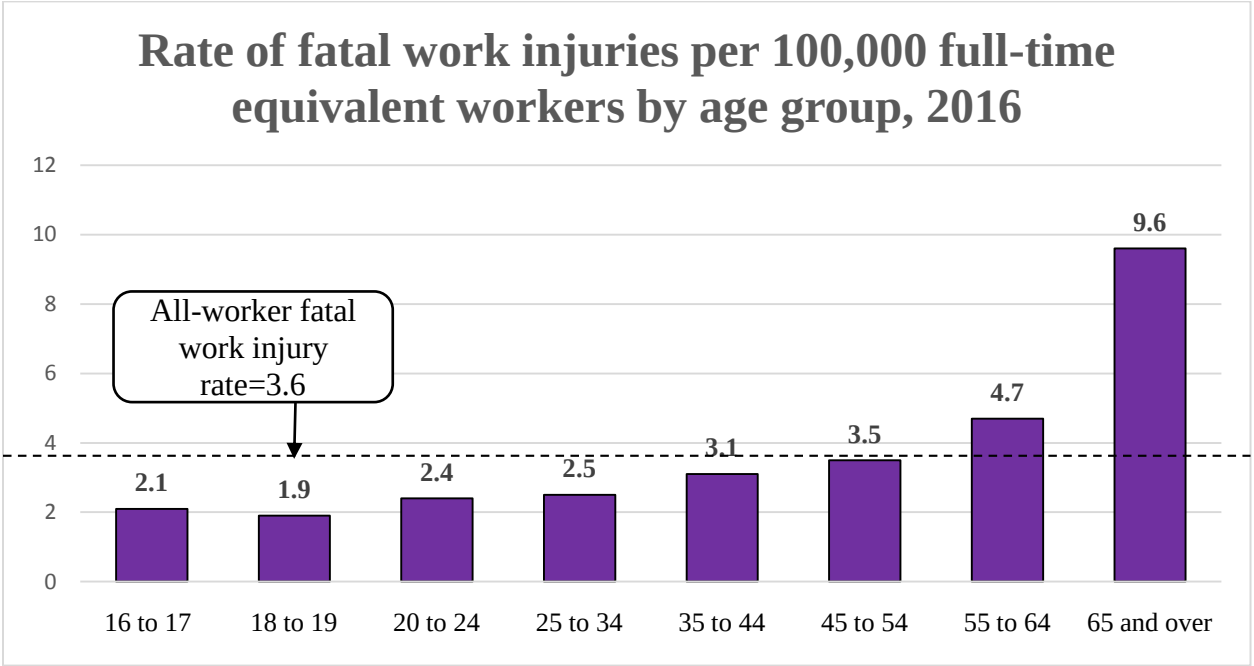

Figure 5. Rate of fatal work injuries per 100,000 full-time equivalent workers by age group (BLS, 2017b)

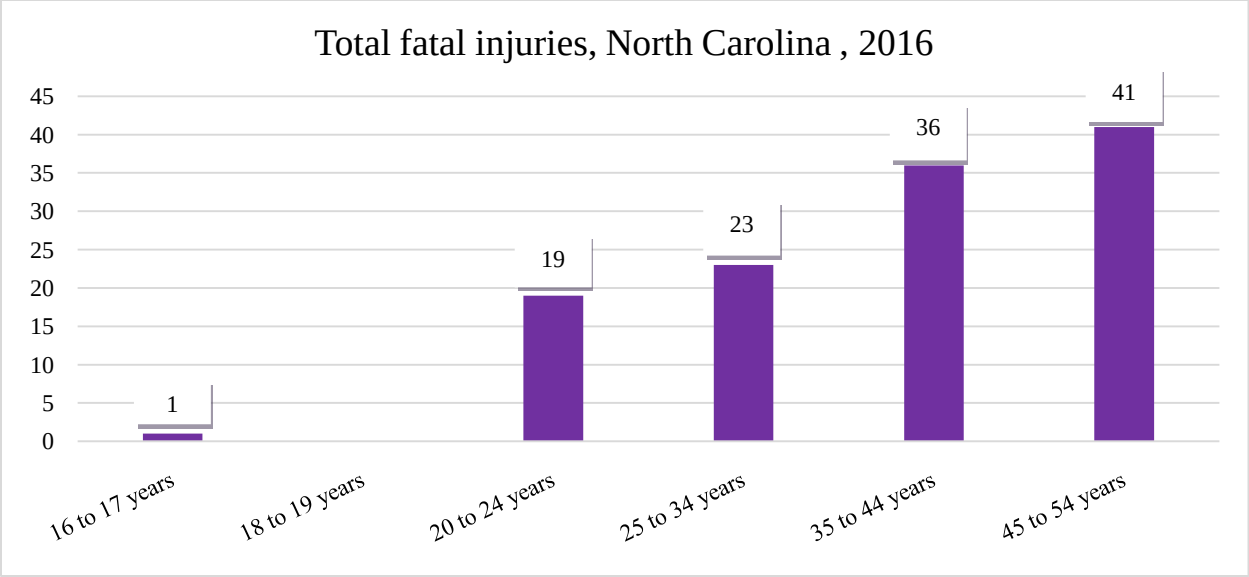

Figure 6. Total fatal injuries in 2016 by age group, North Carolina, United States (BLS, 2017c)

Why Young Workers Are Important? (The Definition of Young Workers)

The importance of young workers can be generally perceived by two factors: the definition of a young worker and considering that they will be the future workforce. In general, there might be various definitions for the young workers. In other words, in pursuance of answering who is considered as a young worker, there will be different definitions associated with some shared points. According to Occupational Safety and Health Administration (OSHA) young workers (ages from 14 to 24) interested in finding different jobs within summer time or during the school are considered at great risk of occupational injuries and accidents due to the lack of experience and also the nature of their developmental stages in different aspects such as emotion, cognition and physical features (OSHA, 2018c). Usually, young workers are considered as transient employees working non-permanently and receiving lower income in the service

sector (Tucker et al., 2011). Figure 7 and 8 indicate the distribution of employed young workers FTEs between the ages of 16 to 17 as an example in United States in 2015 by type of the occupation and industry sector respectively.

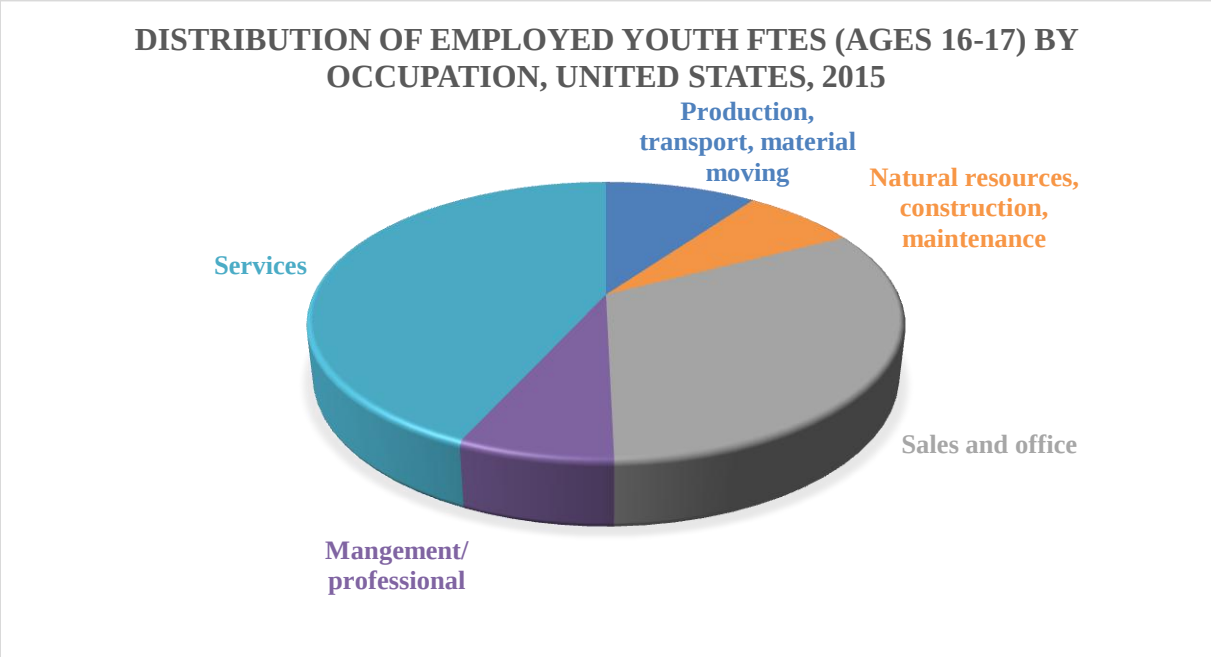

Figure 7. Distribution of employed young workers FTEs, ages 16-17, by type of occupation, US, 2015 (NIOSH, 2017c)

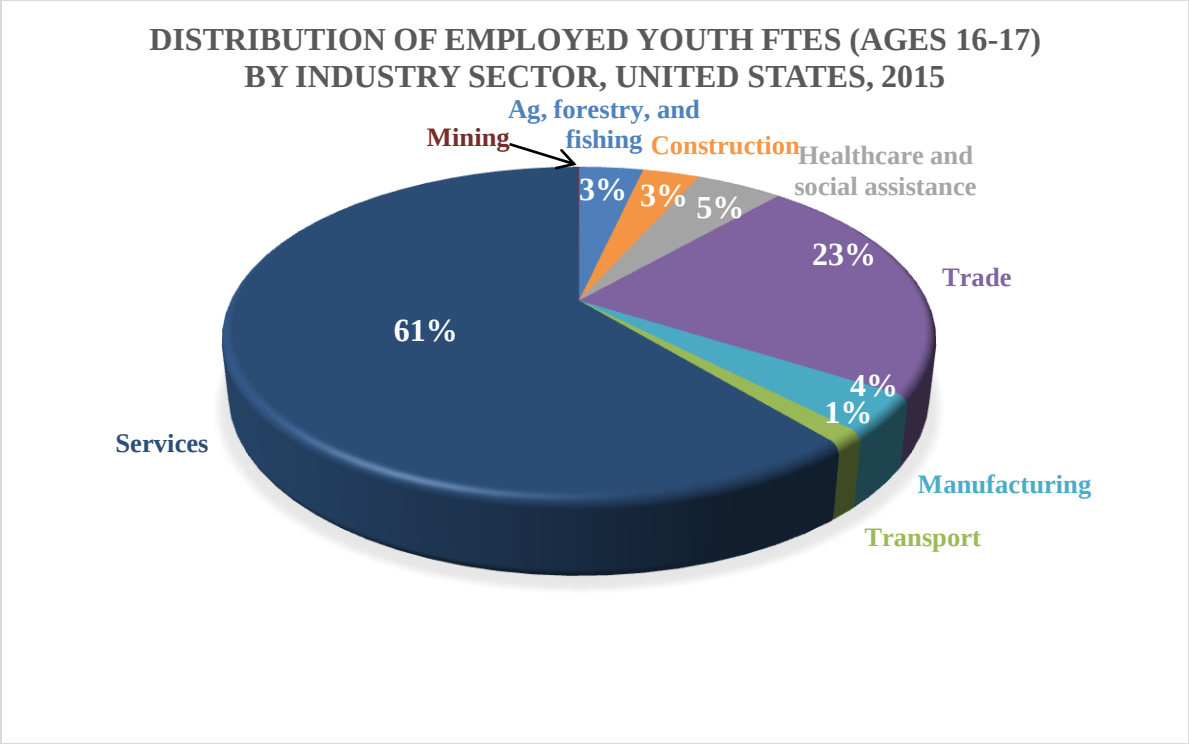

Figure 8. Distribution of employed young workers FTEs, ages 16-17, by industry sector, US, 2015 (NIOSH, 2017d)

The vulnerability of such workers can be also due to lower level of maturity, lower level of work related safety and health training, lower level of skills, lower level of perception of safety and occupational risks. On the other hand, the vulnerability can be owing to the higher level of work speed and work load compared to the older workers. This can be the reason why they are at high risk of work-related injuries and diseases. However, there is some evidence indicates that the risk of occupational illnesses is lower among young workers in comparison with older workers. This lower risk can be justified by the fact that cumulative exposure and latency period are frequently required for the occupational illnesses to be developed and thus the nature of being a transient worker may lead to the lack of immediate recognition of such

diseases. Moreover, among young workers, there may be an unawareness of their lawful rights and employers' safety and health responsibilities. They might be also unwilling, hesitant or unable to talk (for any reason exemplified in being afraid of getting fired) about work related risks.

Work Condition

Work condition is similarly among the factors that exert negative influence on young worker's vulnerability in terms of safety and health. This is regularly associated with monotonous work requiring less special skill or training, less efficient control over the work and non-standard working shifts such as weekends, holidays and nights. The latter factor can augment the occupational safety and health related risks especially on evenings, nights and late afternoons owing to the less supervision by managers and supervisors over the work and other problems such as lower lighting provision, disruption to regular repeated pattern of sleeping and eating. In consequence of these last problems, sleeping and eating disorders, cardiovascular disorders, circadian rhythm disorder, mental and physical exhaustion leading to poor concentration can occur. Furthermore, working condition is generally designed for adults that might be problematic for young workers to adopt adaptive approach because of their physical characteristics. This last one can be exemplified in tools and personal protective equipment (PPE) design or height of working surfaces possibly posing safety and ergonomic risks on young workers by creating a condition for them to have awkward postures along with employing unsafe tools (Kines et al., 2013). Therefore, these might be the reasons why some organizations and agencies such as ILO have several conventions and recommendations in relation to young workers' safety and health. For instance, minimum age convention (C138), part-time work

convention and recommendation (C175; R182) and night work of young people conventions and recommendations (C006; C079; C090; R014; R080) by ILO demonstrate the importance of young workers' protection (ILO, 2018).

LITERATURE REVIEW

Important Literatures Regarding Safety and Health of Young Workers

Breslin et al. (2011) in their study concluded that sufficient safety and health training in the form of individual training on the job is required to enhance young workers' information and skill regarding health and safety. According to them considerable age segregation in the labor market can lead to the different occupational hazard exposures for young workers. They also mentioned in their study that young workers have higher occupational injury rates compared to other age groups because they mostly select specific workplaces such as service and retail sales requiring more physical jobs so that they can cover their basic living expenses (Breslin et al., 2011). Similarly, Tucker et al. (2013) mentioned the service sector has the highest level of employment among young Canadian workers.

Prior to this, the European Agency for Safety and Health at Work (2006) also approved that young workers mainly selected service sector, retail sales and restaurants for working and suggested that safety and health risk identification is an essential for the effective prevention. This agency mentioned that the rate of non-fatal occupational incidents among the age group of 18 to 24 years old was 40 % higher than the total workforce per 100,000 workers. Chin et al. (2010) in their study indicated lower participation rate and low quality of safety and health training programs along with young workers' attitudes towards safety can be the contributory factors in higher rate of young workers' occupational injuries (European Agency, 2006; Chin et al., 2010)

There are some studies that provided some evidence regarding the gender difference in risk inequality among young workers. These studies indicated that young male workers have

significantly higher rate of occupational injuries at work (Chin et al., 2010; Salminen, 2004; Shendell et al., 2012; Perritt et al., 2017; Laberge at al., 2011; Lavack et al., 2008; Turner et al., 2015). However, Pek et al. (2017) found women had greater probability of work-related injuries. Turner et al. (2015) believed that work may involve young male workers more than young female workers and consequently this can lead to higher probability of occupational injuries among young males. Therefore, young male workers might talk more about safety or unsafe work conditions (Turner et al., 2015). However, according to Tucker et al. (2014) men and women young workers equally tended to talk about unsafe conditions at work. Moreover, Tucker et al. (2013) in their study found that young males tended to stop talking about safety at work whereas whenever young females attempted to talk about safety, supervisors refused to accept.

According to Lavack et al. (2008) young workers may do the same as the other people have done at work which means they can be simply influenced by other people. This can be negative especially when other young coworkers adopt unsafe act (Lavack et al., 2008). However, Pek et al. (2017) in the study among large sample of young workers found that regular piece of advice or order regarding safety from supervisors, coworkers and parents can minimize the risk of occupational injuries. However, Tucker et al. (2014) in the study of young workers in a restaurant work environment mentioned that hazardous work conditions may not be necessarily communicated to coworkers and supervisors by young workers. Thus, managers, coworkers and supervisors are required to know about efficacious safety communication (Tucker et al., 2014). Rauscher et al. (2012) noted that family connections can reduce the work-related hazards. According to their study in construction sites, the protection may be provided by family ties for the young workers in construction in the form of closer task monitoring, additional safety instructions, conducting regular checks on the young workers, more safety training and careful

supervision regarding safety (Rauscher et al., 2012). Tucker et al. (2013) emphasized that the start of a job has the highest rate of vulnerability to occupational injuries for the young workers because they have an extreme reluctance to talk about safety and unsafe conditions. Furthermore, the relationship between the young workers and their coworkers or supervisors is not completely formed at this level.

Perritt et al. (2017) in the study among workers younger than 18 years old in the US between the years of 1994 to 2013 found 416 fatality cases (44%) out of the total 942 were in the summer time. They also mentioned the time between 12 pm and 6 pm has the highest fatality rate with 391 cases (42%).

What Are the Possible Factors that Bring Risk Inequality among Workers?

Most of the activities include ubiquitous risks while the concept of the risk contributes to judge correctly about the significance of human attempts concerning their ability to adopt preventive and protective approach against adverse events. It is notable to mention that as occupational safety and health is one of the significant elements of developed modern societies, on the other hand occupational accidents is currently one of the main sources of risk. Accordingly, the considerable growth of interest in understanding the occupational risks is logically justified. The possible categories for occupational risks can be summarized in the events causing hazard of major injury or damage, the events causing hazard of minor or temporary injury or damage along with possible financial burdens and common risks potentially causing damage to the reputation. Furthermore, occupational injuries can be notably controlled and prevented by acquiring information about risk factors or the causes of the adverse events (Papazoglou et al., 2017; Azadeh-Fard et al., 2015; Fernández-Muñiz et al., 2012; Tchiehe et al.,

2017). It is abundantly clear that workers unequally experience different job hazards in different worksites. This brings risk inequality among workers. In general, there are many factors that play the crucial role in risk inequality among workers such as the type of the job, age, gender, inequality in social protection, management commitment, safety training, etc. However, here according to the International Labor Organization (ILO) and furthermore, with regard to the purpose of this study, some possible factors that can generally create risk inequality among workers are considered (ILO, 2011).

Experience and Skill

According to the National Institute for Occupational Safety and Health (NIOSH), workers can engage in control activities and hazard identification by means of their acquired information and skills. It was emphasized new operations and planning in the organizations which include workers can be a reliable method for achieving success and enhancing productivity along with motivation of the workers. Adopting such approach appears logical because workers have working experience as they have close contact with work responsibilities leading to detailed knowledge and invaluable experience of the job itself and related hazards. As a result of this they can be considered as an excellent source of corrective ideas. This is congruent with the factor of being inexperienced as a possible gap in job safety and health training as notably mentioned in Bureau of Labor Statistics (BLS) work injury reports (Appendix 3). Accordingly, the percentage of the injured workers with no more than one year's experience is something in the region of 22% to 78% and this percentage is more than 15 % for some types of injuries during the first six months experience at the work. It can be implied that experience plays a significant role in facing occupational risks in different jobs. The researches have mostly demonstrated a negative linear relation between job experience and accidents as an occupational

risk which means that when worker's experience increases, there is a reduction in the probability of the accident. However, some others indicated different trend exemplified in the U-shaped relation which means the employees working at least 1-year, experienced small number of accidents in comparison with those working 3 months or 12 months (NIOSH, 1998; Burt, 2015). Figure 9 depicts these two mentioned hypothetical relationships between job experience and the rate of the accidents.

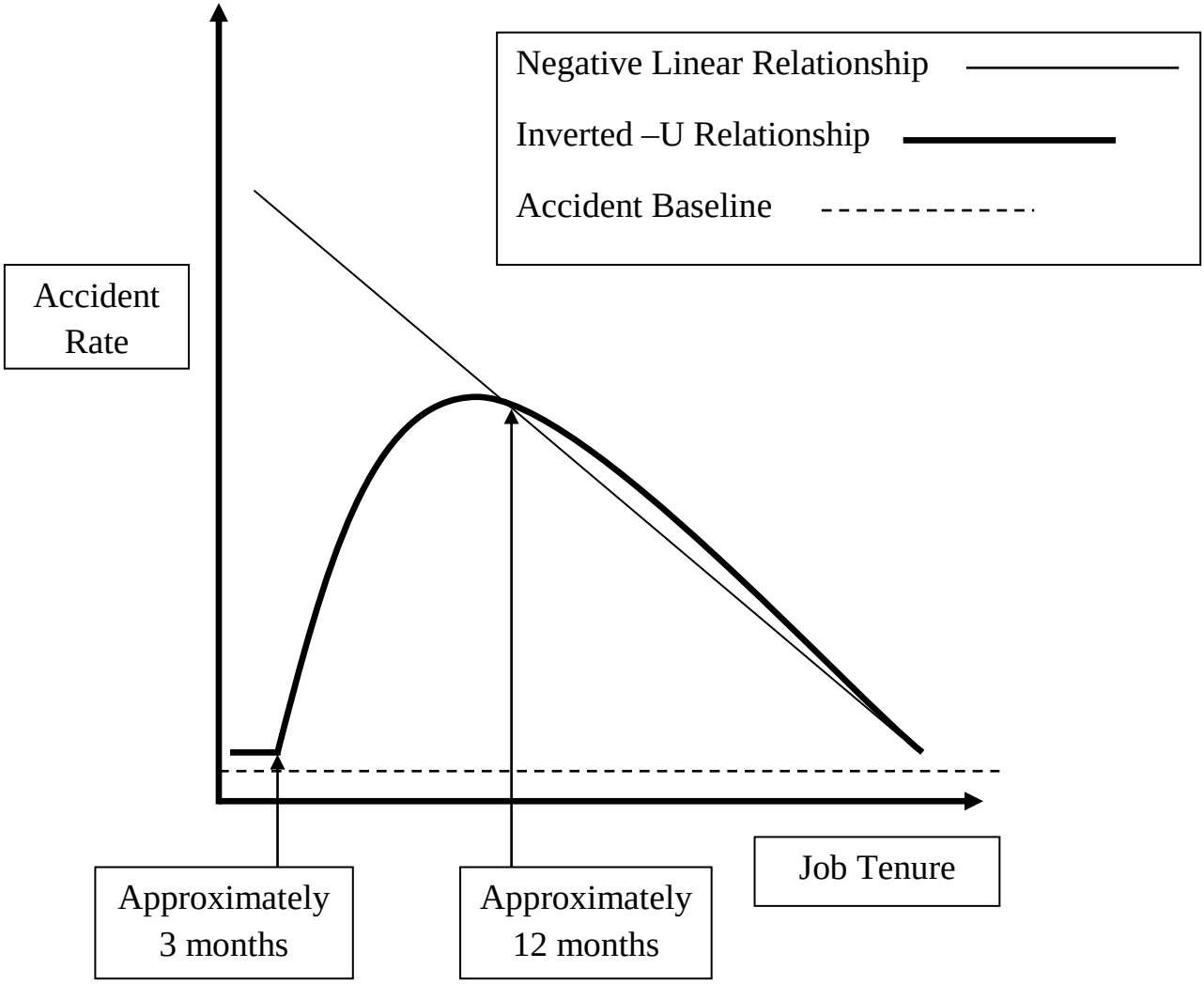

Figure 9. Hypothetical relationships between the job tenure and accident rates (Burt, 2015).

Wage

Generally, in normal condition, the purpose of the wages or payments is to compensate employees for occupational risks whereas at the time of an accident, insurance with the title of worker's compensation plays the role in reimbursement for the worker's injury owing to the occupational accident.

The wage schemes consist of several types exemplified in salary, piece rate and extra wage. Any type except salary is typically considered as an incentive system which can be counterproductive and cause adverse influences on workers' safety and health conditions. However, the primary purpose of such systems is to enhancing workers' performance resulting in productivity enhancement. Extra wage and piece rates are specific wage schemes in relation to occupational safety and health normally paid owing to particular situation such as the overtime, inappropriate and hazardous work conditions, holiday working. This concludes mostly to prolonged hours of working leading to the occupational risks for workers. That is because in such payment systems productivity comes to the first priority exerting adverse influence on workers' safety and health. Consequently, this adverse influence will decrease the productivity benefits (Murray et al., 2007; Rhee et al., 2015).

Organizational Culture

Occupational accidents impose negative effects on workers that can have major consequences for both employees and organizations such as lack of success despite considerable personal and organizational attempts, adverse influence on workers' attitude dealing with consequences of damages, financial burdens, death or injury due to the occupational accidents. It is notable to mention that recent organizational changes frequently bring considerable transitions

for workers exemplified in new responsibilities and tasks, new managers and colleagues, job insecurity and different social positions. These organizational changes in many organizations have led to recent built planned series of actions for occupational safety and health management that mostly could not achieve success because the influence of organizational culture was not considered. Organizational culture can be defined as the workers' behaviors in the organizations considering productivity, attitudes, perceptions, values that being able to be adaptive by mean of organizational learning. This perception of the organizational values is highly significant because it exerts effect on the worker's interpretation on policies, rules and procedures (Strauch, 2015; Mathisen et al., 2017; Kim et al., 2016; Johnson et al., 2016; Colley et al., 2013).

Life and work events: stress

Job stress is originated from the perception that the work demands are considerably higher than worker's physical or mental abilities and knowledge to be dealt with. This type of stress is one of the most significant topics owing to its influence on individuals and organizations such as adverse effects on performance in the job, organizational behavior imposing high financial burdens on organizations. Moreover, it can lead to personal health problems such as anxiety, lack of motivation and being unsafe at work. Hence, occupational stress can be a serious problem both for organizations and employees. Generally, factors such as poor job design, weak work organization and poor management can be the root cause of the job stress. According to the National Institute for Occupational Safety and Health (NIOSH) job stress can be defined as "harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker". NIOSH also provided following

model for job stress based on the research and experience (Othman et al., 2014; Brate, 2014; WHO, 2003; NIOSH, 1999).

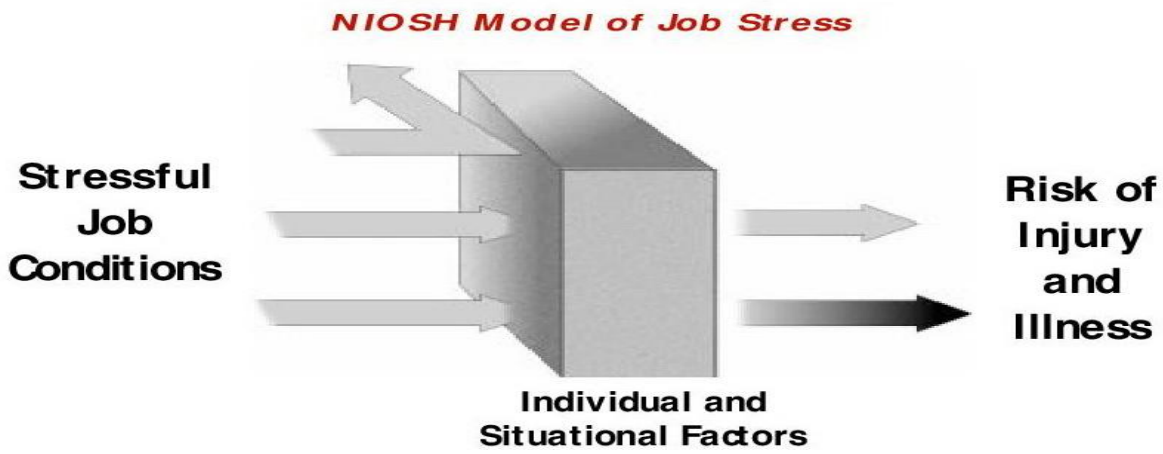

Figure 10. NIOSH model of job stress (NIOSH, 1999)

Risk Perception

There is an attempt in all industries to enhance work quality and adopt preventive approaches towards occupational accidents by means of promoting and developing safety in their worksites. However, occupational accidents still remain extremely problematic for organizations considering all those enhancements in their working conditions. Recently, risk control has become highly significant and notable in all organizations and worksites leading to a creation of unanimous agreement on the fact that controlling risks depends on both individual and organizational activities in all managerial and personnel levels. It is also notable how individuals perceive the risks and how their behaviors are modified towards the risks that can be invisible or unclear. Because probable misinterpreting of the possible risk sources is inevitable considering biased approaches in perceiving risks. Furthermore, risk sources can have different features which are probably significant in perception of the risks such as severity of the bad outcomes,

risk control and individual knowledge about hazardous risks being contacted with. Notably, risk perception can be understood in consequence of judging about such risk sources. This judgment about possible risks can be originated from not accurately evaluating the severity of the hazards in the worksites. There are some factors exerting influence on this judgment such as experience of prior occupational injury, how good or bad is the safety related training and sometimes cultural values exemplified in belief in fatalism or good and bad luck. It is significant to mention that conscious or unconscious thinking and evaluation of information is certain for decision making influenced by risk perception and consequently develops a judgment (Leiter et al., 2009; Kouabenan et al., 2015; Arezes et al., 2008; Rundmo et al., 2017; Simsekoğlu et al., 2013; Iavicoli et al., 2011).

Why Safety Culture Is Important? (The Definition of Safety Culture)

According to the definition of culture by Schein (2004): "Culture is both a dynamic phenomenon that surrounds us at all times, being constantly enacted and created by our interactions with others and shaped by leadership behavior, and a set of structures, routines, rules, and norms that guide and constrain behavior. When one brings culture to the level of the organization and even down to groups within the organization, one can see clearly how culture is created, embedded, evolved, and ultimately manipulated, and, at the same time, how culture constrains, stabilizes, and provides structure and meaning to the group members".

He believed that there are different levels of culture in the conducted cultural analysis considering the degree of visibility related to cultural phenomenon for the observer. These levels of culture are summarized as follow:

1. Artifacts:

This level is all about features and actualities of the new group that a new person can sees, hears and feels in order to get acquainted with the unfamiliar culture. In other words, the artifacts consist of the factors such as language, environment, technology, style, stories about an organization, ceremonies, list of values and so forth that have the visibility characteristics in the group. Notably, this level of culture is simple to notice but at the same time is very complicated to interpret. This specifically means inferring the profound assumptions by considering only artifacts can be problematic and risky owing to the fact that person's interpretations will be unavoidably based on the feelings and reactions.

2. Espoused Beliefs and Values

This level is frequently utilized in order to provide questionnaire surveys of culture. Authentic beliefs and values are the reflection of what group learns. In encountering the new responsibilities, problems and issues the initial suggestion for resolution indicates a number of individuals' assumptions apropos of distinguishing between being right or wrong along with being effective or not. These individuals who exert influence on the group and are able to adopt specific approach will be considered as leaders. Thereafter, if the leaders or managers persuade the group to proceed according to their beliefs and also the group reach to the shared perception of their effective resolutions then these perceived values or beliefs initially turn into shared values or beliefs and finally into a shared assumption. A large amount of behavior related to the artifacts level can be predicted by means of the beliefs and values at this level. However, the behavior frequently remains inexplicable to the great extent by means of espoused beliefs and values. Therefore, there is a feeling that only a part of culture is understood. It is significant to

know that the more completely third level which is basic underlying assumptions is understood, the more profound understanding, interpreting the pattern and appropriate prediction of future behavior will be achieved.

3. Basic Underlying Assumptions

Achieving success frequently in resolving the problem leads to a belief that the solution is true without making certain or in other words it is taken for granted. At this point this solution which was once considered as hypothesis espoused only by a value, it is slowly regarded as an actuality or a reality. Thus, basic assumptions are considered as theories and general principles which cannot be arguable and consequently changing them is considerably difficult. Arguing a basic assumption can lead to anxiety and defensive manner when it is known that human mind requires stability of cognition. Hence, learning new things needs resurrection, reexamination and changing the stable parts of the cognitive structure. It is notable to mention that these shared basic assumptions not only create the culture of a group but also they can be considered individually and collectively as psychological cognitive defense mechanisms leading to performing function by the group. Hence, changing the individual's pattern of defense mechanisms is inevitable when changing aspects of the culture in group is pursued. Achieving success in knowing apropos of underlying assumptions can be obtained by some factors such as the careful observation of behavior or paying careful attention to anomalies and inconsistencies. As a conclusion, it is significant to know that correct interpretation of the artifacts and the espoused values and beliefs will not occur if the pattern of basic assumptions is not interpreted. This means the most basic and important part of the culture is the pattern of basic underlying assumptions. Therefore, interpretation of those can lead to both being able to easily interpret two other levels and adopting appropriate approach towards them (Schein, 2004; Schein, 1988).

According to what was previously mentioned apropos of the possible factors that bring risk inequality among workers, organizational culture is one the factors that exert influence on the inequality of work-related risks in the field of occupational safety and health. By reason of this, the fact that how organizational culture and safety are related to each other has been regarded as essential in researches apropos of safety for more than thirty years (Almklov et al., 2017). On the other hand, the significant role of organizational, managerial and social factors in safety, and therefore in the prevention of occupational accidents has become clearly evident. This is mainly because globally, a large number of hazardous industries have obviously perceived that the risk factors such as human, management and organization assume a crucial role in serious accidents (Kines et al., 2011; Herrero et al., 2013). Safety is concerned and carefully noted after several major accidents such as Triangle Shirtwaist factory fire (1911), Hawks Nest Tunnel (1930s), Three Mile Island (TMI) (1979), Challenger explosion (1986) and Chernobyl (1986). The number of such major accidents has reduced afterwards but organizational incidents still exist at the present time. Safety culture has become a common organizational factor paving the way for discussing such important accidents and incidents. Safety culture can be originated from one of the most catastrophic nuclear power accidents in the history occurred at Chernobyl in 1986. The International Safety Advisory Group (INSAG) as an advisory group to the International Atomic Energy Agency (IAEA) was responsible for Chernobyl accident investigation. As a result of recognizing the contributory factors in this accident, the term poor safety culture was applied. Thereafter, since 1989 The Nuclear Regulatory Commission (NRC) has emphatically expressed the significant role of strong safety culture in nuclear industry. Subsequently in 2003, International labor organization (ILO) declared poor safety culture among major contributory and preventable factors in work related

accidents. Such accidents comprised 19 percent of the main causes of global occupational fatalities. It is notable to mention that investigations after the accidents such as TMI and Chernobyl frequently indicated that an organization with poor safety culture can have the potential for major incidents. This means safety culture can be a leading indicator of performance and prevent major accidents. Positive Safety culture can exert positive influence on workers' beliefs apropos of the safety importance, workers' attitude toward safety and the perception of safety behaviors and how to work safely. In general, safety culture is a particular part of organizational culture considering shared beliefs, values and attitudes in organizations that can be a contributory factor in making certain about safe operations (Cole et al., 2013; ILO, 2003; Morrow et al., 2014). Therefore, Safety culture can be defined as workers' shared concepts, attitudes, opinions and behaviors in relation to safety with consideration of procedures, actions and plans for risk reduction which can lead to the prevention of occupational accidents and diseases (Su et al., 2012). In other words, the reflection of individual, collective and organizational attitudes, values and behaviors regarding safety can be the general concept of safety culture (Ek et al., 2014). Moreover, Nunen et al. (2017) concluded that safety culture is a generic and broad term which includes all technological, organizational and human aspects. However, they believed that conducted researches on safety culture can be geographically unequal considering the economic development (Nunen et al., 2017).

Real Case Study

The accident occurred in Kentucky State on Tuesday November 4th, 2015, almost 4:50 pm at the end of 8-hour work shift when two young workers with 17 and 19 years old were at an agriculture distribution center. The19 year old worker was parking a rough terrain JCB 930 forklift in a gated parking lot while he asked the other worker (17-year-old victim) if he needed a

ride to storage place. The victim used the side step of the forklift while he kept his balance by holding the frame. In general, the purpose of side step in the forklift is not carrying the passengers. Then victim offered the driver to open the gate for him at the storage area, but he jumped from the forklift when it did not completely stop by driver. The 17-year-old worker's (victim) foot got stuck in the back wheel guard of the forklift and he fell on the ground. The older worker (forklift driver) was unaware that his coworker had fallen and kept on driving the forklift. Shortly thereafter, the driver understood that the victim was run over by the rear tire of the forklift. The young worker died from his injuries although he was transported to the major trauma center (NIOSH, 2016).

Purpose of the Study and Possible Outcomes

As it can be observed in this case study, the influence of the factors such as work experience and risk perception is abundantly clear. It is also notable to mention that although there might not be a tangible evidence of the effects originated from the factors such as management commitment, safety training and safety communication in this case study but by contrast, these factors as the part of safety culture can play the key role in both this fatal accident and many others. For this reason, the study of safety culture and applying its results in pursuance of promoting safety and preventing accidents in different industries has been paid attention and can be an indispensable necessity for any industries. Therefore, with regard to the importance of both young workers and safety culture the purpose of this study (considering the limitations) will be formed in both the answering of the following questions:

- What will be the relation among safety culture factors in the study of young workers?

- What will be the relation among safety culture and demographic variables in the study of young workers?
- What will be the score indicating young workers' perception and their level of attitude towards the factors of safety culture?
- What will be the score indicating young workers' perception and their level of attitude towards the safety culture?

And observing the fact that how young workers as a part of workforce look at different aspects of safety culture such as management commitment, safety communication and safety training.

Moreover, this study might have some possible outcomes such as:

- Informing on the issue of why young workers are important
- Expressing and emphasizing the requirement for future research
- Providing an incentive for young workers to know more about safety
- Reducing both the hesitation of asking and their lack of knowledge apropos of safety in the workplace

METHODOLOGY

This is a descriptive analytical research with the purpose of studying about safety culture specifically concentrated on young workers. In other words, young workers' perceptions of safety in general and different safety culture factors were targeted at this research.

Schein (1988) mentioned various concept-based origins or research streams in perceiving the organizational culture concept which similarly the same can be concluded for the safety culture as a part of it. These research streams are survey research, empirical descriptive, ethnographic, historical and clinical descriptive. Hence, the present study is also a survey-based research utilizing safety culture questionnaire. Students at East Carolina University who were working currently or in the past summer were invited to participate in the study. That is because based on OSHA's young workers definition they could be the appropriate population target for this research considering the fact that their ages are normally between 18 and 24 years old. Moreover, the number of students as the sample size was determined after IRB approval (ID: UMCIRB 18-002985) which is required prior to the commencement of the research.

The research was conducted in fall semester 2018 at East Carolina University. In order for studying safety culture among young workers, standard safety culture questionnaire validated and applied by Cox and Cheyne (2000) was used.

The significant role of management in any organization and its influence on every levels of an organization is undeniable. This is crucial to the extent that if management does not believe and admit the occupational injury reports, young workers will not be motivated anymore to report work related injuries and consequently culture of being quiet towards unsafe work conditions will be created (Chin et al., 2010).On the other hand, in order to ensure positive safety

culture among young workers at workplace, it is required to involve them in safety. This means giving young workers power and a voice to be heard by clarifying their rights and two-way effective safety communications which can be the best way of encouraging them in safety and health at work (European agency, 2013). By reason of this, in present study four safety culture factors of Management Commitment, Safety Communication, Safety Involvement and Work Environment (previously discussed in this research) were applied. However, the main safety culture questionnaire in study of Cox and Cheyne (2000) comprises nine safety culture factors.

The questions for each safety culture factors were selected by considering the following reasons:

1. The importance of some factors such as management commitment, work environment and safety communication which exert considerable influence on young workers safety and health at work

2. Related significant points based on the young workers' definition

3. Study limitations

4. Simplifications, summarizing and removal of redundant information

5. Informing the young workers about factors such as how they are important, their rights, reducing their lack of knowledge and know more about safety, reducing their hesitation etc.

The questionnaire was provided as a paper survey in two pages with five main sections indicated by letters A, B, C, D, and E respectively. The first section contained demographic information such as gender, racial origin, job satisfaction, job sector and work experience. Other sections respectively contained total number of 15 questions in relation to Management

Commitment, Safety Communication, Safety Involvement and Work Environment as the safety culture structural factors.

The study commenced with the explanation of the aims leading students to express their satisfaction with participating in this research. They were also respectfully explained this is a voluntary research and they might choose not to answer the questions or stop answering them at any time. Hence, there will be no penalty for not participating in this research. Moreover, this was an anonymous survey-based research study and they were asked not to write their names in order to both guarantee complete confidentiality and not to have untrue answers. Thereafter, students who had the mentioned criteria of being young workers were respectfully asked to fill in the safety culture questionnaires in a tranquil and friendly atmosphere. The lack of cooperation was understood as the intent to leave the study.

Scoring the questionnaires was based on Likert scale. Students who had the conditions of being young workers based on OSHA's definition were given the options in the form of strongly agree, agree, neutral, disagree and strongly disagree for each question. The phrase of strongly agree in the positively-keyed items was given the score of 5 and the score of other phrases were considered 4,3,2,1 respectively. The negatively-keyed items were needed to reverse score. In order for analyzing the data the version 22 of SPSS software was used.

The statistical analysis was conducted by means of the descriptive statistics such as mean, standard deviation and frequency distribution so as to determine young workers' perception and their level of attitude towards the factors of safety culture. Considering the distribution of collected data, the statistical tests such as Pearson, Spearman and Analysis of Variance (ANOVA) tests were used in order to analyze the relation among young workers'

perception and their attitude towards safety culture and demographic variables and the safety culture factors.

Survey Questions

As it was discussed before, Likert scale was applied to score the safety culture survey. The four safety culture structural factors associated with their questions in the form of statements are as follow:

Management Commitment

1. In my workplace management acts quickly to correct safety problems
2. Corrective action is always taken when management is told about unsafe practices
3. In my workplace managers/supervisors show interest in my safety
4. Management acts only after accidents have occurred

Safety Communication

1. There is good communication here about safety issues which affect me
2. Safety information is always brought to my attention by my manager/supervisor
3. My manager/supervisor does not always inform me of current concerns and issues
4. Management operates an open door policy on safety issues

Safety Involvement

1. I am involved in informing management of important safety issues

2. I am involved with safety issues at work
3. I am never involved in the ongoing review of safety

Work Environment

1. Sometimes I am not given enough time to get the job done safely
2. Sometimes conditions here hinder my ability to work safely
3. There are always enough people available to get the job done safely
4. I cannot always get the equipment I need to do the job safely

RESULTS

The total number of 142 young workers participated in this study including 62 female and 80 male students. Approximately 70 percent of them had the job experience more than a year and considerably 41.5 percent of these young workers were satisfied up to 75 percent regarding their jobs (Note: they were asked to answer a question concerning job satisfaction by giving a percentage). Considering the previous literatures regarding young workers, as it was expected, most of the students (67.6 %) had work experience in service sector. Notably, 39 cases have experienced accidents in their workplaces. Table 2 indicates descriptive statistics regarding the demographic variables in this research. Moreover, there was no significant relation among these demographic variables in this study of safety culture among young workers.

Table 2. Descriptive statistics regarding the demographic variables

Demographic Variables	Categories	Frequency	Percent
Gender	Female	62	43.7
	Male	80	56.3
Work Experience	< 3 months	4	2.8
	3-6 months	16	11.3
	6 months< & <12months	23	16.2
	> 12 months (a year)	99	69.7
Job Satisfaction	< 25%	10	7.0
	25%-50%	32	22.5
	50%-75%	59	41.5
	> 75%	41	28.9
Job Sector	Service	96	67.6
	Industry	40	28.2
	Trade	6	4.2
Any Experienced Accident	Yes	39	27.5
	No	103	72.5
	Total of Each Demographic Variable	142	100

The Reliability Analysis

The result of the reliability analysis is indicated in Table 3. The Cronbach's alpha was calculated for this study so as to assess the reliability or internal consistency. The Cronbach's alpha was more than .618 for all factors of safety culture. Hence, considering the following table, it is implied that this Safety Culture survey has relatively high internal consistency.

Table 3. The reliability analysis for all factors of safety culture

Reliability Statistics	Management Commitment	Safety Communication	Safety Involvement	Work Environment	Total
Cronbach's Alpha	.733	.708	.618	.824	.856

Analyzing the correlation among Safety Culture factors

In order to analyze the correlation among safety culture factors in the study of young workers, the Pearson correlation coefficient was applied. The results are indicated in Table 4. It is noteworthy to mention that (**) indicates the correlation is significant at the 0.01 (1%) level. According to this table, there is a positive, significant and strong correlation between safety culture and all of its factors among young workers. Safety culture has the highest correlation with the factors of management commitment (r=0.819) and safety communication (r=0.837). All of the safety culture factors are positively and significantly correlated among youth workers. However, there is no significant correlation between two factors of safety involvement and work environment. Management commitment and safety communication (r=0.705) along with safety communication and work environment (r=0.517) have the highest correlation with each other among all factors of safety culture.

Table 4. Pearson Correlation Coefficient for analyzing the correlation among Safety Culture factors

Pearson Correlations		Management Commitment	Safety Communication	Safety Involvement	Work Environment	Safety Culture
Management Commitment	Pearson Correlation	1	.705**	.301**	.507**	.819**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	142	142	142	142	
Safety Communication	Pearson Correlation	.705**	1	.342**	.517**	.837**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	142	142	142	142	
Safety Involvement	Pearson Correlation	.301**	.342**	1	.147	.599**
	Sig. (2-tailed)	.000	.000		.081	.000
	N	142	142	142	142	
Work Environment	Pearson Correlation	.507**	.517**	.147	1	.748**
	Sig. (2-tailed)	.000	.000	.081		.000
	N	142	142	142	142	
Safety Culture	Pearson Correlation	.819**	.837**	.599**	.748**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N					142

** Correlation is significant at the 0.01 level (2-tailed).

Analyzing the correlation among Safety Culture structural factors with demographic variables

Work Experience and Job Satisfaction

Spearman's rho Correlation Coefficient was utilized in order to analyze the correlation among safety culture factors with two demographic variables of work experience and job satisfaction. Table 5 indicates the obtained results. With regard to p-value analysis and Spearman's rho correlation coefficient there is a significant correlation between safety culture and these two demographic variables. However, work experience is negatively correlated with safety culture (-0.170) while this significant correlation between safety culture and job satisfaction is positive (0.497). Notably, (*) indicates that the correlation is significant at the 0.05

(5%) level. Furthermore, there is a significant positive correlation among job satisfaction and all safety culture factors. However, there is no significant correlation among safety culture factors and work experience. As it can be seen in Table 5, all calculated Spearman's rho correlation coefficients to analyze relation between safety culture factors and work experience is negative numbers. Job satisfaction has the highest positive and significant correlation with management commitment (0.461) and safety communication (0.472).

Table 5. Spearman's rho Correlation Coefficient for analyzing the correlation among safety culture factors with work experience and job satisfaction

Spearman's rho Correlation Coefficient		Management Commitment	Safety Communication	Safety Involvement	Work Environment	Safety Culture	Work Experience	Job Satisfaction
Management Commitment	Correlation Coefficient	1	.669**	.295**	.439**	.764**	-.128	.461**
	Sig. (2-tailed)		.000	.000	.000	.000	.129	.000
Safety Communication	Correlation Coefficient	.669**	1	.326**	.474**	.814**	-.098	.472**
	Sig. (2-tailed)	.000		.000	.000	.000	.246	.000
Safety Involvement	Correlation Coefficient	.295**	.326**	1	.100	.568**	-.124	.273**
	Sig. (2-tailed)	.000	.000		.239	.000	.142	.001
Work Environment	Correlation Coefficient	.439**	.474**	.100	1	.714**	-.149	.271**
	Sig. (2-tailed)	.000	.000	.239		.000	.078	.001
Safety Culture	Correlation Coefficient	.764**	.814**	.568**	.714**	1	-.170*	.497**
	Sig. (2-tailed)	.000	.000	.000	.000		.043	.000
Work Experience	Correlation Coefficient	-.128	-.098	-.124	-.149	-.170*	1	-.026
	Sig. (2-tailed)	.129	.246	.142	.078	.043		.762
Job Satisfaction	Correlation Coefficient	.461**	.472**	.273**	.271**	.497**	-.026	1
	Sig. (2-tailed)	.000	.000	.001	.001	.000	.762	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Gender

Analysis of the relation between safety culture factors and demographic variable of gender is conducted by one way analysis of variance (ANOVA). Table 6,7and 8 indicate the results of this analysis. As it can be seen with regard to Tables 6 and 8, there is a significant relation between safety culture and gender. There is a significant difference between the female and male young workers about safety culture (F (1,140) = 3.977, p= 0.048) in 95% confidence interval for mean. The total score of safety culture was acquired 3.57. Moreover, based on the Tables 6 and 8 there is a significant relation between gender and two safety culture factors of management commitment (3.80) and safety involvement (3.44). Hence, there is a significant difference between female and male young workers about management commitment (F (1,140) = 5.070, p=0.026) and safety involvement (F (1,140) = 12.303, p=0.001) in 95% confidence interval for mean. The lowest score is for work environment among safety culture factors (3.40) and management commitment has the highest score (3.80). There is no significant relation between gender and two safety culture factors of safety communication and work environment.

Table 6. Descriptive results from ANOVA in analyzing the relation between gender and safety culture factors

Descriptives		N	Mean	Std. Deviation	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Management Commitment	Female	62	3.6532	.71911	3.4706	3.8358
	Male	80	3.9156	.66435	3.7678	4.0635
	Total	142	3.8011	.69862	3.6852	3.9170
Safety Communication	Female	62	3.5242	.72529	3.3400	3.7084
	Male	80	3.7281	.66465	3.5802	3.8760
	Total	142	3.6391	.69670	3.5235	3.7547
Safety Involvement	Female	62	3.1935	.86534	2.9738	3.4133
	Male	80	3.6458	.67159	3.4964	3.7953
	Total	142	3.4484	.79205	3.3170	3.5798
Work Environment	Female	62	3.4919	.91209	3.2603	3.7236
	Male	80	3.3375	.85509	3.1472	3.5278
	Total	142	3.4049	.88061	3.2588	3.5510

Safety Culture	Female	62	3.4657	.59720	3.3141	3.6174
	Male	80	3.6568	.54098	3.5364	3.7772
	Total	142	3.5734	.57211	3.4784	3.6683

Table 7. Test of homogeneity of variances

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
Management Commitment	.992	1	140	.321
Safety Communication	1.344	1	140	.248
Safety Involvement	4.032	1	140	.047
Work Environment	.366	1	140	.546
Safety Culture	.415	1	140	.521

Table 8. ANOVA result in analyzing the relation between gender and safety culture factors

ANOVA		Sum of Squares	df	Mean Square	F	Sig.
Management Commitment	Between Groups	2.405	1	2.405	5.070	.026
	Within Groups	66.412	140	.474		
	Total	68.817	141			
Safety Communication	Between Groups	1.453	1	1.453	3.036	.084
	Within Groups	66.988	140	.478		
	Total	68.441	141			
Safety Involvement	Between Groups	7.145	1	7.145	12.303	.001
	Within Groups	81.309	140	.581		
	Total	88.455	141			
Work Environment	Between Groups	.833	1	.833	1.075	.302
	Within Groups	108.508	140	.775		
	Total	109.342	141			
Safety Culture	Between Groups	1.275	1	1.275	3.977	.048
	Within Groups	44.875	140	.321		
	Total	46.150	141			

Job Sector

In order to analyze the relation between job sector and safety culture factors, similarly one-way analysis of variance (ANOVA) was applied. The results are indicated in Tables 9, 10 and 11. Furthermore, since the number of young workers who worked in trade sector was not considerable, the only 6 cases of this sector were added to industry sector for more convenience in applying statistical method of ANOVA. There is a significant relation between safety culture and job sector. This means there is a significant difference regarding safety culture (F (1,140) =13.052, p=0.000) between young workers who worked in service sector compared with the ones who worked in industry and trade in 95% confidence interval for mean. According to the Table 9 and 11 there is a significant relation between young workers in service compared to the ones in industry and trade regarding safety culture factors of management commitment (3.80), safety communication (3.63) and safety involvement (3.44). There is a significant difference between two groups of young workers in service sector and industry including trade about management commitment (F (1,140) = 12.825, p=0.000), safety communication (F (1,140) = 13.328, p=0.000) and safety involvement (F (1,140) = 13.163, p=0.000) in 95% confidence interval for mean. There is no significant relation between work environment and job sector.

Table 9. Descriptives resulted from ANOVA in analyzing the relation between job sector and safety culture factors

Descriptives		N	Mean	Std. Deviation	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Management Commitment	Service	96	3.6615	.67957	3.5238	3.7992
	Industry+Trade	46	4.0924	.65268	3.8986	4.2862
	Total	142	3.8011	.69862	3.6852	3.9170
Safety Communication	Service	96	3.4974	.66143	3.3634	3.6314
	Industry+Trade	46	3.9348	.68198	3.7323	4.1373
	Total	142	3.6391	.69670	3.5235	3.7547
Safety	Service	96	3.2882	.77629	3.1309	3.4455

Involvement	Industry+Trade	46	3.7826	.72424	3.5675	3.9977
	Total	142	3.4484	.79205	3.3170	3.5798
Work Environment	Service	96	3.3854	.87878	3.2074	3.5635
	Industry+Trade	46	3.4457	.89274	3.1805	3.7108
	Total	142	3.4049	.88061	3.2588	3.5510
Safety Culture	Service	96	3.4581	.51752	3.3533	3.5630
	Industry+Trade	46	3.8139	.61049	3.6326	3.9952
	Total	142	3.5734	.57211	3.4784	3.6683

Table 10. Test of homogeneity of variances

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
Management Commitment	.165	1	140	.685
Safety Communication	.103	1	140	.749
Safety Involvement	.000	1	140	.995
Work Environment	.586	1	140	.445
Safety Culture	1.152	1	140	.285

Table 11. ANOVA result in analyzing the relation between job sector and safety culture factors

ANOVA		Sum of Squares	df	Mean Square	F	Sig.
Management Commitment	Between Groups	5.775	1	5.775	12.825	.000
	Within Groups	63.042	140	.450		
	Total	68.817	141			
Safety Communication	Between Groups	5.949	1	5.949	13.328	.000
	Within Groups	62.491	140	.446		
	Total	68.441	141			
Safety Involvement	Between Groups	7.602	1	7.602	13.163	.000
	Within Groups	80.853	140	.578		
	Total	88.455	141			
Work Environment	Between Groups	.113	1	.113	.145	.704
	Within Groups	109.229	140	.780		
	Total	109.342	141			
Safety Culture	Between Groups	3.936	1	3.936	13.052	.000
	Within Groups	42.214	140	.302		
	Total	46.150	141			

Any Experienced Accident

Analysis of this demographic variable and safety culture factors is also conducted by one-way analysis of variance (ANOVA). The results are indicated in Tables 12, 13 and 14. There is a significant relation between safety culture and whether the respondent experienced a workplace accident. This means there is a significant difference between young workers who had accident before and those ones who did not about safety culture (F (1,140) = 13.044, p= 0.000) in 95% confidence interval for mean. Based on the Tables 12 and 14 there is a significant relation between the young workers who experienced accident at workplace compared to the ones who did not regarding safety culture factors of management commitment (3.80), safety communication (3.63) and work environment (3.40). This means there is a significant difference between the two groups of young workers who had accident experience and who did not concern management commitment (F (1,140) =7.567, p=0.007), safety communication (F (1,140) =4.103, p=.045) and work environment (F (1,140) =26.798, p=0.000) in 95% confidence interval for mean. There is no significant relation between this demographic variable and safety culture factor of safety involvement which means there is no significant difference between the young workers who had accident experience compared with who did not regarding safety involving.

Table 12. Descriptive results from ANOVA in analyzing the relation between demographic variable of any experienced accident and safety culture factors

Descriptives		N	Mean	Std. Deviation	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Management Commitment	Yes	39	3.5449	.74311	3.3040	3.7858
	No	103	3.8981	.65906	3.7693	4.0269
	Total	142	3.8011	.69862	3.6852	3.9170
Safety Communication	Yes	39	3.4487	.71905	3.2156	3.6818
	No	103	3.7112	.67769	3.5787	3.8436

	Total	142	3.6391	.69670	3.5235	3.7547
Safety Involvement	Yes	39	3.3846	.82554	3.1170	3.6522
	No	103	3.4725	.78177	3.3197	3.6253
	Total	142	3.4484	.79205	3.3170	3.5798
Work Environment	Yes	39	2.8333	.85903	2.5549	3.1118
	No	103	3.6214	.79046	3.4669	3.7758
	Total	142	3.4049	.88061	3.2588	3.5510
Safety Culture	Yes	39	3.3029	.62930	3.0989	3.5069
	No	103	3.6758	.51610	3.5749	3.7766
	Total	142	3.5734	.57211	3.4784	3.6683

Table 13. Test of homogeneity of variances

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
Management Commitment	1.816	1	140	.180
Safety Communication	.291	1	140	.591
Safety Involvement	.421	1	140	.518
Work Environment	.194	1	140	.660
Safety Culture	2.113	1	140	.148

Table 14. ANOVA result in analyzing the relation between demographic variable of any experienced accident and safety culture factors

ANOVA		Sum of Squares	df	Mean Square	F	Sig.
Management Commitment	Between Groups	3.529	1	3.529	7.567	.007
	Within Groups	65.289	140	.466		
	Total	68.817	141			
Safety Communication	Between Groups	1.948	1	1.948	4.103	.045
	Within Groups	66.492	140	.475		
	Total	68.441	141			
Safety Involvement	Between Groups	.218	1	.218	.347	.557
	Within Groups	88.236	140	.630		
	Total	88.455	141			
Work Environment	Between Groups	17.567	1	17.567	26.798	.000
	Within Groups	91.775	140	.656		
	Total	109.342	141			
Safety Culture	Between Groups	3.933	1	3.933	13.044	.000
	Within Groups	42.217	140	.302		
	Total	46.150	141			

DISCUSSION

The results of the study indicate that there is a good reliability of safety culture questionnaire previously validated by Cox and Cheyne (2000) in order to investigate safety culture among young workers.

It is notable to mention that most of the young workers have the work experience in the service sector (67.6 %) which is compatible with both Tucker et al. (2013) and Breslin et al. (2011) who found that young workers mostly select workplaces such as service and retail sales to cover their basic living expenses.

Approximately 30 percent of the young workers in this study have experienced accidents in their workplaces which is considerable. Chin et al. (2010) mentioned this considerable rate of occupational accidents among young workers can have some contributory factors such as lower participation rate and low quality of safety and health training programs along with young workers' attitudes towards safety.

According to the acquired results, there is a positive, significant correlation among a majority of safety culture factors. Furthermore, this positive and significant correlation can be observed between all 4 factors and safety culture indicating the close and strong relation among the 4 factors of safety culture. Hence, anything that can influence (positive or negative) on one of the factors, it can be influential in other factors of safety culture. However, there is no significant correlation between two safety culture factors of safety involvement and work environment. This can be probably originated from the perception that participation and involvement in safety among young workers is not related to a specific workplace or a specific work condition.

Based on the results, safety culture has the highest positive and significant correlation with management commitment and safety communication. It can be implied young workers in this study perceived that management plays a crucial role in safety and health of workers at any workplace and furthermore, only effective communication regarding safety and health can promote their safety at work and create positive safety culture. The results of current study regarding management commitment is compatible with the findings of Chin et al. (2010) who concluded that the significant role of management in any organization and its influence on every levels of an organization is undeniable. This is crucial to the extent that if management does not believe and admit the occupational injury reports, young workers will not be motivated to report work related injuries and consequently a culture of being quiet towards unsafe work conditions will be created. Flin (2003) mentioned that there is a requirement of an approach concentrating on safety culture in order to have effective safety management in an organization. For this Flin (2003) also emphasized management commitment to safety at any level is one of the most important factors, which supports the findings concerning management commitment in this study. The role of effective communication and management also supported by Pek et al. (2017) who found in their study even regular advice regarding safety and health from supervisors, coworkers and parents can minimize the risk of occupational injuries among young workers. Moreover, Tucker et al. (2014) found that effective communication regarding safety and health among young workers, managers, coworkers and supervisors was necessary to communicate hazardous work conditions to coworkers and supervisors by young workers. The results of this study regarding safety communication are also compatible with Flin (2003) study who concluded that safety commitment of the management should be controlled in order to be transmitted to others.

In this study, safety culture is negatively and significantly correlated with work experience which means that among young workers more work experience leads to the lower safety culture. This can be due to the different reasons such as sense of complacency or self-confidence originated from more work experience which usually leads to some type of resistance to safety rules at workplace. On the other hand, young workers with lower work experience have a more positive view towards safety culture. This can be originated from the perception when someone starts working or has less work experience, they encounter new occupational hazards, feel less safe and thus become more prudent to safety and health at workplace. This is compatible with the findings of Tucker et al. (2013) who emphasized that at the start of a job, young workers are most vulnerable to occupational injuries because they have an extreme reluctance to talk about safety and unsafe conditions. Furthermore, the relationship between young workers and their coworkers or supervisors is not completely formed at this level.

The results indicate that there is a positive and significant correlation between job satisfaction and safety culture among young workers. There is a positive and significant correlation exists between all safety culture factors and job satisfaction as well. It can be inferred that young workers are more satisfied regarding their jobs if there is more management commitment to safety, more effective safety communication or safety involvement among young workers and safer work environment. Hence, more job satisfaction can lead to cultivate more positive safety culture among them. Michael et al. (2005) also supported this result when they found there is a positive relationship between management commitment and job satisfaction, organizational commitment and occupational performance.

According to the obtained results, there is a significant difference between male and female young workers point of view regarding safety culture and safety culture structural factors

of management commitment and safety involvement. The results indicate that male young workers have a more positive view towards safety culture and two factors of management commitment and safety involvement compared to female workers. This is compatible Turner et al. (2015) who believed that work may involve young male workers more than young female workers and consequently this can lead to higher probability of occupational injuries among young males. Therefore, young male workers might talk more about safety or unsafe work conditions. There are also other studies that provided some evidence regarding the gender difference in risk inequality among young workers and supported the findings of the current research. These studies indicated that young male workers have significantly higher rate of occupational injuries at work (Chin et al., 2010; Salminen, 2004; Shendell et al., 2012; Perritt et al., 2017; Laberge at al., 2011; Lavack et al., 2008; Turner et al., 2015). Hence, it can be the reason for having a more positive view towards safety culture and two factors of management commitment and safety involvement. However, the results of the current study can be compatible with the findings of Pek et al. (2017) found women had greater probability of work-related injuries and thus they should have more positive view towards safety culture. There might be another reason for this significant difference in the more positive view towards safety culture and two factors of safety involvement and management commitment which is mentioned in Tucker et al. (2013) regarding whenever young females attempted to talk about safety, supervisors refused to accept.

The results of this study indicate that there is a significant difference between young workers who worked in service sector and industry including trade sector regarding safety culture. This significant difference can be also observed for three safety culture factors of management commitment, safety communication and safety involvement. Hence, it can be

inferred that young workers who worked in industry and trade sector have a more positive view towards safety culture and three factors of management commitment, safety communication and safety involvement compared to those who worked in service sector. The more positive view can be originated from this point that usually in industry, safety and health of all workers is given more attention compared to the service sector which also is usually a small business. Moreover, this significant difference leading to more positive view regarding safety culture can be due to the additional unsafe work conditions or encountering the variety of occupational hazards in industry sector.

Finally, based on the finding of the current study there is a significant difference between young workers who have experienced accidents at work and those one who have not regarding safety culture and three structural factors of management commitment, safety communication and work environment. Hence, it can be implied that young workers who did not have occupational accidents at their workplaces have a more positive view concerning safety culture and the three factors of management commitment, safety communication, and work environment in comparison with those ones who had work related accidents. This can be stemmed from this fact that those young workers who have not experienced accidents might perceive positively and have more confident about management commitment, effective safety communication and safer work environment leading to not experiencing occupational accidents. As a result of this, a more positive view regarding safety culture can be created. However, those young workers who experienced accidents at work have lower positive view regarding safety culture. This result is supported by the finding of Milczarek and Najmiec (2004) who found that lower levels of safety culture can be created among those workers who experienced accidents or hazardous situations.

CONCLUSION

Management commitment is the most important safety culture factor that plays a crucial role in the safety and health of young workers. Management, as the most influential element, can exert positive influence and adopt proactive approaches towards effective safety communication among all levels of the organization. Moreover, management can develop a comprehensive program to get everyone involved in safety and health at work effectively and actively. Consequently, this can lead to cultivate positive safety culture at the work place and create safe work environments. Young workers should be involved in these safety communications. Thus, it is better to give them a voice to talk about safety and limit the sense of being reluctant to talk. Notably, it can lead to cultivate a more positive approach towards safety which exerts a positive effect on safety culture among young workers. Continuous and efficacious safety and health training program should be developed for young workers in order to familiarize them with different aspects of safety and health at work, educate them about related occupational hazards and teach them their rights at work. This should be done regardless of gender difference, job sector and work experience for all young workers whether they have experienced accidents at work or not.

Recommendations for Future Studies

In this study, it is attempted to research and investigate about all those important safety culture factors that can exert influence on youth workers' safety and health. However, similar to any other studies this research also has several limitations that should be considered. For example only East Carolina University students surveyed in this research, being a part-time or full-time worker was not clarified, there was the lack of qualitative results due to the lack of interest in being interviewed and also type of the job was not mentioned. These limitations might

create some potential for more studies in the future. Specifically, the qualitative studies can be an excellent support for the results of this research. Moreover, the current study can be considered as an opportunity for more research in the future regarding safety and health of young workers.

REFERENCES

Almklov, P. G., Antonsen, S., Bye, R., & Øren, A. (2017). Organizational culture and societal safety: Collaborating across boundaries. Safety Science. https://doi.org/10.1016/j.ssci.2017.12.029

Arezes, P. M., & Miguel, A. S. (2008). Risk perception and safety behaviour: A study in an occupational environment. Safety science, 46(6), 900-907.

Azadeh-Fard, N., Schuh, A., Rashedi, E., & Camelio, J. A. (2015). Risk assessment of occupational injuries using Accident Severity Grade. Safety science, 76, 160-167.

Brate, A. T. (2014). Diagnosing occupational stress in Romanian organizations. Procedia-Social and Behavioral Sciences, 127, 559-564.

Breslin, F. C., Morassaei, S., Wood, M., & Mustard, C. A. (2011). Assessing occupational health and safety of young workers who use youth employment centers. American journal of industrial medicine, 54(4), 325-337.

Bureau of Labor Statistics (BLS). (2017a).Graphics for Economic News Releases. Rate of fatal work injuries per 100,000 full-time equivalent workers by age group. Access at: https://www.bls.gov/charts/census-of-fatal-occupational-injuries/rate-of-fatal-work-injuries-per-100000-fte-by-age.htm

Bureau of Labor Statistics (BLS). (2017b). Census of Fatal Occupational Injuries Charts, 1992-2016 (final data). Static charts, Census of Fatal Occupational Injuries, 2016. Access at: https://www.bls.gov/iif/oshwc/cfoi/cfch0015.pdf

Bureau of Labor Statistics (BLS). (2017c). Fatal occupational injuries in North Carolina in 2016. Access at: https://www.bls.gov/iif/oshwc/cfoi/tgs/2016/iiffw37.htm

Burt, C. D. (2015). Risk factors and management strategies. New employee accident rates. In New Employee Safety (Chapter 2 pp.1-15). New Zealand: Springer.

Cadick, J., Neitzel, D. K., & Capelli-Schellpfeffer, M. (2006). Electrical safety handbook. McGraw-Hill. Chapter 7. Page 1. DOI: 10.1036/0071457720

Census of Fatal Occupational Injuries Summary. (2018). Bureau of Labor Statistics (BLS). Access at: https://www.bls.gov/iif/oshcfoi1.htm

Chin, P., DeLuca, C., Poth, C., Chadwick, I., Hutchinson, N., & Munby, H. (2010). Enabling youth to advocate for workplace safety. Safety science, 48(5), 570-579.

Cohen, A., Colligan, M. J., Sinclair, R., Newman, J., & Schuler, R. (1998). Assessing occupational safety and health training. A Literature Review.Cincinnati, OH: National Institute for Occupational Safety and Health (NIOSH), 1-174. DHHS (NIOSH) Publication No. 98-145
Cole, K. S., Stevens-Adams, S. M., & Wenner, C. A. (2013). A Literature Review of Safety Culture. Sandia National Laboratories: Livermore, CA, USA.

Colley, S. K., Lincolne, J., & Neal, A. (2013). An examination of the relationship amongst profiles of perceived organizational values, safety climate and safety outcomes. Safety Science, 51(1), 69-76.
Cox, S. J., & Cheyne, A. J. T. (2000). Assessing safety culture in offshore environments. Safety science, 34(1-3), 111-129.

Ek, Å., Runefors, M., & Borell, J. (2014). Relationships between safety culture aspects–A work process to enable interpretation. Marine Policy, 44, 179-186. DOI:10.1016/j.marpol.2013.08.024

European Agency for Safety and Health at Work. (2006). E-fact 8. A statistical portrait of the health and safety at work of young workers. Access at: https://osha.europa.eu/en/tools-and-publications/publications/e-facts/efact08

European Agency for Safety and Health at Work. (2013). E-fact 78. Involving young workers in OSH. Access at: https://osha.europa.eu/en/tools-and-publications/publications/e-facts/e-fact-78-involving-young-workers-in-osh

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2012). Occupational risk management under the OHSAS 18001 standard: analysis of perceptions and attitudes of certified firms. Journal of Cleaner Production, 24, 36-47.

Flin, R. (2003). "Danger—men at work": Management influence on safety. Human Factors and Ergonomics in Manufacturing & Service Industries, 13(4), 261-268.

Frazier, C. B., Ludwig, T. D., Whitaker, B., & Roberts, D. S. (2013). A hierarchical factor analysis of a safety culture survey. Journal of safety research, 45, 15-28. DOI: 10.1016/j.jsr.2012.10.015

García-Herrero, S., Mariscal, M. A., Gutiérrez, J. M., & Toca-Otero, A. (2013). Bayesian network analysis of safety culture and organizational culture in a nuclear power plant. Safety science, 53, 82-95. Doi:10.1016/j.ssci.2012.09.004

Hämäläinen, P., Takala, J., & Saarela, K. L. (2006). Global estimates of occupational accidents. Safety science, 44(2), 137-156. DOI:10.1016/j.ssci.2005.08.017

Hämäläinen, P., Saarela, K. L., & Takala, J. (2009). Global trend according to estimated number of occupational accidents and fatal work-related diseases at region and country level. Journal of safety research, 40(2), 125-139. DOI:10.1016/j.jsr.2008.12.010

International Labor Organization (ILO). (2003). Safety in numbers. Pointers for a global safety culture at work.92-2-113741-4[ISBN]

International Labor Organization (ILO). (2011). Workers' Compensation: Trends and Perspectives. Access at: http://www.iloencyclopaedia.org/part-iii-48230/topics-in-workers-compensation-systems/26/workers-compensation-trends-and-perspectives

International Labor Organization (ILO). (2014). Safety and Health at Work: A Vision for Sustainable Prevention. XX world congress on safety and health at work. Global Forum for Prevention, 24 - 27 August 2014, Frankfurt, Germany / International Labor Office. - Geneva: ILO, 2014. ISBN: 9789221289081; 9789221289098

International Labor Organization (ILO). (2018). Conventions and Recommendations. Access at: http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C138

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C175

http://ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:R182

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C006

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C079

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C090

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:R014

http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:R080

Johnson, J., Haegeli, P., Hendrikx, J., & Savage, S. (2016). Accident causes and organizational culture among avalanche professionals. Journal of Outdoor Recreation and Tourism, 13, 49-56.

Kines, P., Lappalainen, J., Mikkelsen, K. L., Olsen, E., Pousette, A., Tharaldsen, J., ... & Törner, M. (2011). Nordic Safety Climate Questionnaire (NOSACQ-50): A new tool for diagnosing occupational safety climate. International Journal of Industrial Ergonomics, 41(6), 634-646. Doi:10.1016/j.ergon.2011.08.004

Kines, P., Framke, E., Salmi, A., & Bengtsen, E. (2013). Young workers' occupational safety and health risks in the Nordic countries. Nordic Council of Ministers. DOI: 10.6027/TN2013-569

Kim, Y., Park, J., & Park, M. (2016). Creating a culture of prevention in occupational safety and health practice. Safety and health at work, 7(2), 89-96.

Kouabenan, D. R., Ngueutsa, R., & Mbaye, S. (2015). Safety climate, perceived risk, and involvement in safety management. Safety Science, 77, 72-79.

Laberge, M., & Ledoux, E. (2011). Occupational health and safety issues affecting young workers: A literature review. Work, 39(3), 215-232.

Lavack, A. M., Magnuson, S. L., Deshpande, S., Basil, D. Z., Basil, M. D., & Mintz, J. J. H. (2008). Enhancing occupational health and safety in young workers: the role of social marketing. International Journal of Nonprofit and Voluntary Sector Marketing, 13(3), 193-204.

Iavicoli, S., Natali, E., Deitinger, P., Rondinone, B. M., Ertel, M., Jain, A., & Leka, S. (2011). Occupational health and safety policy and psychosocial risks in Europe: the role of stakeholders' perceptions. Health Policy, 101(1), 87-94.

Leiter, M. P., Zanaletti, W., & Argentero, P. (2009). Occupational risk perception, safety training, and injury prevention: Testing a model in the Italian printing industry. Journal of occupational health psychology. 2009, Vol. 14, No. 1, 1–10

Leka, S., Griffiths, A., Cox, T., & World Health Organization (WHO). (2003). Work organization and stress: systematic problem approaches for employers, managers and trade union representatives. Protecting Workers' Health Series; no.3

Mathisen, G. E., Brønnick, K., Arntzen, K. J., & Bergh, L. I. V. (2017). Identifying and managing psychosocial risks during organizational restructuring: It's what you do and how you do it. Safety science, 100, 20-29.

Michael, J. H., Evans, D. D., Jansen, K. J., & Haight, J. M. (2005). Management commitment to safety as organizational support: Relationships with non-safety outcomes in wood manufacturing employees. Journal of safety research, 36(2), 171-179.

Milczarek, M., & Najmiec, A. (2004). The relationship between workers' safety culture and accidents, near accidents and health problems. International Journal of Occupational Safety and Ergonomics, 10(1), 25-33.

Morrow, S. L., Koves, G. K., & Barnes, V. E. (2014). Exploring the relationship between safety culture and safety performance in US nuclear power operations. Safety Science, 69, 37-47. Doi:10.1016/j.ssci.2014.02.022

Murray, J. E., & Nilsson, L. (2007). Accident risk compensation in late imperial Austria: Wage differentials and social insurance. Explorations in Economic History, 44(4), 568-587.

Occupational Safety and Health Administration (OSHA). (2018a).Business Case for Safety and Health. Access at: https://www.osha.gov/dcsp/products/topics/businesscase/costs.html

Occupational Safety and Health Administration (OSHA). (2018b). OSHA's Safety Pays Program. Estimated Costs of Occupational Injuries and Illnesses and Estimated Impact on a Company's Profitability Worksheet. Access at: https://www.osha.gov/dcsp/smallbusiness/safetypays/estimator.html

Occupational Safety and Health Administration (OSHA). (2018c). Factsheet. Young workers. Access at: https://www.osha.gov/Publications/young_workers.html

Othman, C. N., Lamin, R. A. C., & Othman, N. (2014). Occupational stress index of Malaysian university workplace. Procedia-Social and Behavioral Sciences, 153, 700-710.

Papazoglou, I. A., Aneziris, O. N., Bellamy, L. J., Ale, B. J., & Oh, J. (2017). Quantitative occupational risk model: Single hazard. Reliability Engineering & System Safety, 160, 162-173.

Pek, S., Turner, N., Tucker, S., Kelloway, E. K., & Morrish, J. (2017). Injunctive safety norms, young worker risk-taking behaviors, and workplace injuries. Accident Analysis & Prevention, 106, 202-210.

Perritt, K. R., Hendricks, K. J., & Goldcamp, E. M. (2017). Young worker injury deaths: a historical summary of surveillance and investigative findings. The National Institute for Occupational Safety and Health (NIOSH).Access at: https://www.cdc.gov/niosh/docs/2017-168/pdfs/2017-168.pdf?id=10.26616/NIOSHPUB2017168

Rahmani, A., Khadem, M., Madreseh, E., Aghaei, H. A., Raei, M., & Karchani, M. (2013). Descriptive study of occupational accidents and their causes among electricity distribution company workers at an eight-year period in Iran. Safety and health at work, 4(3), 160-165. DOI: 10.1016/j.shaw.2013.07.005

Rauscher, K. J., Myers, D. J., Runyan, C. W., & Schulman, M. (2012). Young worker safety in construction: Do family ties and workgroup size affect hazard exposures and safety practices?. Work, 42(4), 549-558.

Rhee, K. Y., Kim, Y. S., & Cho, Y. H. (2015). The type of payment and working conditions. Safety and health at work, 6(4), 289-294.

Rikhardsson, P. M., & Impgaard, M. (2004). Corporate cost of occupational accidents: an activity-based analysis. Accident Analysis & Prevention, 36(2), 173-182. DOI: 10.1016/S0001-4575(02)00147-1

Rodrigues, M. A., Arezes, P., & Leão, C. P. (2014). Risk criteria in occupational environments: critical overview and discussion. Procedia-Social and Behavioral Sciences, 109, 257-262. DOI: 10.1016/j.sbspro.2013.12.455

Rundmo, T., & Nordfjærn, T. (2017). Does risk perception really exist?. Safety science, 93, 230-240.

Salminen, S. (2004). Have young workers more injuries than older ones? An international literature review. Journal of safety research, 35(5), 513-521.

Sauter, S., Murphy, L., Colligan, M., Swanson, N., Hurrell, J., Jr., Scharf, F., Jr., Sinclair, R., Grubb, P., Goldenhar, L., Alterman, T., Johnston, J., Hamilton, A., Tisdale, J. (1999). Stress at work. National Institute for Occupational Safety and Health (NIOSH). DHHS (NIOSH) Publication No. 99–101

Schein, E. H. (1988). Organizational Culture. Sloan School of Management, MIT. WP# 2088-88

Schein, E. H. (2004). Organizational Culture and Leadership (Jossey-Bass Business & Management Series). Jossey Bass Incorporated.

Shalini, R. T. (2009). Economic cost of occupational accidents: Evidence from a small island economy. Safety science, 47(7), 973-979. DOI:10.1016/j.ssci.2008.10.021

Shendell, D. G., Jhaveri, M., Campbell, J. K., Kelly, S. W., Marshall, E. G., Nowakowski, A. C., & Wozniak, M. E. (2012). Young worker safety: Incident reporting among working minors in New Jersey. Professional Safety, 57(01), 51-58.

Şimşekoğlu, Ö., Nordfjærn, T., Zavareh, M. F., Hezaveh, A. M., Mamdoohi, A. R., & Rundmo, T. (2013). Risk perceptions, fatalism and driver behaviors in Turkey and Iran. Safety science, 59, 187-192.

Stellman, J. M. (Ed.). (1998). Encyclopaedia of occupational health and safety. International Labour Organization. Fourth edition. Geneva: International Labor Organization (ILO). Doc=8574000041/22/2006

Strauch, B. (2015). Can we examine safety culture in accident investigations, or should we?. Safety Science, 77, 102-111.

Su, T. S., Lin, P. R., Shu, Y. L., Tseng, J. M., & Kao, C. S. (2012). Analysis of the Multi-Relationships and Their Structures for Safety Culture. Open Journal of Safety Science and Technology, 2(03), 89-97. Doi:10.4236/ojsst.2012.23012

Takala, J., Hämäläinen, P., Saarela, K. L., Yun, L. Y., Manickam, K., Jin, T. W., ... & Lin, G. S. (2014). Global estimates of the burden of injury and illness at work in 2012. Journal of occupational and environmental hygiene, 11(5), 326-337.DOI: 10.1080/15459624.2013.863131

Tchiehe, D. N., & Gauthier, F. (2017). Classification of risk acceptability and risk tolerability factors in occupational health and safety. Safety science, 92, 138-147.

The National Institute for Occupational Safety and Health (NIOSH). (2016). Kentucky Case Report: 15KY067. Access at: https://www.cdc.gov/niosh/face/stateface/ky/15ky067.html

The National Institute for Occupational Safety and Health (NIOSH). (2017a). YOUNG WORKER SAFETY AND HEALTH. Access at: https://www.cdc.gov/niosh/topics/youth/

The National Institute for Occupational Safety and Health (NIOSH). (2017b). YOUNG WORKER SAFETY AND HEALTH. Data for numbers of employed youth FTEs (Ages 16-24) by year, United States, 2000-2015. Access at: https://www.cdc.gov/niosh/topics/youth/xls/chta.xlsx

The National Institute for Occupational Safety and Health (NIOSH). (2017c). YOUNG WORKER SAFETY AND HEALTH. Data for distribution of employed youth FTEs (Ages 16-17) by occupation, United States, 2015.Access at: https://www.cdc.gov/niosh/topics/youth/xls/chtc.xlsx

The National Institute for Occupational Safety and Health (NIOSH). (2017d). YOUNG WORKER SAFETY AND HEALTH. Data for distribution of employed youth FTEs (Ages 16-17) by industry sector, United States, 2015.Access at: https://www.cdc.gov/niosh/topics/youth/xls/chtb.xlsx

Tucker, S., & Turner, N. (2011). Young worker safety behaviors: Development and validation of measures. Accident Analysis & Prevention, 43(1), 165-175. DOI:10.1016/j.aap.2010.08.006

Tucker, S., & Turner, N. (2013). Waiting for safety: Responses by young Canadian workers to unsafe work. Journal of safety research, 45, 103-110.

Tucker, S., & Turner, N. (2014). Safety voice among young workers facing dangerous work: A policy-capturing approach. Safety science, 62, 530-537.

Turner, N., Tucker, S., & Kelloway, E. K. (2015). Prevalence and demographic differences in microaccidents and safety behaviors among young workers in Canada. Journal of safety research, 53, 39-43.

Van Nunen, K., Li, J., Reniers, G., & Ponnet, K. (2017). Bibliometric analysis of safety culture research. Safety science. http://dx.doi.org/10.1016/j.ssci.2017.08.011

APPENDICES

Appendix 1. Institutional Review Board Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Moien Kiani
CC: Michael Behm
Date: 2/25/2019
Re: UMCIRB 18-002985
Investigation of Safety Culture among Youth Workers

I am pleased to inform you that your research submission has been certified as exempt on 2/22/2019. This study is eligible for Exempt Certification under category #2, subcategory A.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

Appendix 2. Safety Culture Survey and Consent Letter

Safety Culture Survey

East Carolina University, MSOS Program

This is a research study titled "Investigation of Safety Culture among Youth Workers" is being conducted by Moien Kiani, a student in the Master of Science Occupational Safety program in the Technology Systems department at East Carolina University. Thus, you are being invited to participate in this study. The purpose of this research is conducting a survey among students between the ages of 18 to 24 years old at East Carolina University who are currently working or previously worked during the summer. The approximate time of 10 minutes will be required to complete this survey. It is notable to mention that, this is a voluntary research and thus you might choose not to answer the questions or stop answering them at any time. There will be no penalty for not participating in this research. Moreover, please do not write your name. This is an anonymous survey-based research study. Please email Moien Kiani at Kianim16@students.ecu.edu for related questions to this study.

Please read each section carefully and fill in the circle regarding your response

Section A: Demographic Information

1. Gender (1) Female◯ (2) Male◯

2. Work Experience (1) Less than 3 months◯ (2) 3 to 6 months◯
(3) More than 6 months and less than12 months◯ (4) More than 12 months (More than a year)◯

3. How are you satisfied about your job considering the income and work time? (Job Satisfaction)
(1) Less than 25%◯ (2) 25%-50%◯ (3) 50%-75%◯ (4) More than 75%◯
Note: Please answer this with percentage.

4. Job Sector (1) Service◯ (2) Industry◯ (3) Trade◯
Note.*Service includes transport, restaurant, retail sale, cashier etc.
**Industry includes construction, agriculture, manufacturing, fishing, mining etc.

5. Have you ever experienced any accident at work? (1) Yes◯ (2) No◯

Section B: M.C.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
In my workplace management acts quickly to correct safety problems	○	○	○	○	○
Corrective action is always taken when management is told about unsafe practices	○	○	○	○	○
In my workplace managers/supervisors show interest in my safety	○	○	○	○	○
Management acts only after accidents have occurred	○	○	○	○	○

Section C: S.C.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There is good communication here about safety issues which affect me	○	○	○	○	○
Safety information is always brought to my attention by my manager/supervisor	○	○	○	○	○
My manager/supervisor does not always inform me of current concerns and issues	○	○	○	○	○
Management operates an open door policy on safety issues	○	○	○	○	○

Section D: S.I.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am involved in informing management of important safety issues	○	○	○	○	○
I am involved with safety issues at work	○	○	○	○	○
I am never involved in the ongoing review of safety	○	○	○	○	○

Section E: W.E.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Sometimes I am not given enough time to get the job done safely	○	○	○	○	○
Sometimes conditions here hinder my ability to work safely	○	○	○	○	○
There are always enough people available to get the job done safely	○	○	○	○	○
I cannot always get the equipment I need to do the job safely	○	○	○	○	○

Consent Letter

Dear Participant,

I am a student at East Carolina University in the Technology Systems department. I am asking you to take part in my research study entitled, "Investigation of Safety Culture among Youth Workers" The purpose of this research is to observe, study and evaluate safety culture among young workers considering the importance of both young workers as the future work force and safety culture as the organizational factor influencing safety and health at work. By doing this research, I hope to learn how safety culture factors correlate with each other in the study of young workers, how safety culture and its structural factors correlated with demographic variable and furthermore to evaluate how youth workers perceived safety culture and its structural factors. Your participation is completely voluntary.

You are being invited to take part in this research because you've been identified as a young worker based on the standard definition of Occupational Safety and Health Administration (OSHA).The amount of time it will take you to complete this survey is approximately 10 minutes. If you agree to take part in this survey, you will be asked questions that relate to some demographic information such as gender and work experience in the first section of the survey. In the next section there will be some questions regarding safety culture factors such as "In my workplace management acts quickly to correct safety problems or I am involved in informing management of important safety issues" that should be answered by selecting the options as follow: strongly agree, agree, neutral, disagree, strongly disagree.

This research is overseen by the University and Medical Center Institutional Review Board (UMCIRB) at ECU. Therefore, some of the UMCIRB members or the UMCIRB staff may need to review your research data. However, the information you provide will not be linked to you. It is notable to mention this survey is an anonymous study to guarantee complete confidentiality. Therefore, your responses cannot be traced back to you by anyone, including me. If you have questions about your rights when taking part in this research, call the Office of Research Integrity & Compliance (ORIC) at 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, call the Director of Human Research Protections, at 252-744-2914.

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, please indicate your verbal consent and we will continue on with the survey process. Thank you for taking the time to participate in my research.

Sincerely,

Moien Kiani

Principal Investigator

Appendix 3. Possible Gabs in Job Safety and Health Training

Summary of Possible Gaps in Job Safety/Health Training as Noted in Bureau of Labor Statistics (BLS) Work Injuiry Reports

Worker Injuries Surveyed	Nature of Limitation				
	Limited Coverage	Content Lacking	Refresher Needs	Inexperience Factor	Policy/Action Lapses
Ladder Injuries	59% lacked training on ladder use	66% lacked training on how to inspect	Training for 50% over 1 year ago		
Scaffold Injuries	26-35% not trained in scaffolding tasks		Training for 71% over 1 year ago		
Welding/Cutting Injuries	30% learned job safety "on their own"		Training for 69% over 1 year ago	26% injured <l yr at job; 16% <6 months	
Power Saw Injuries	39% learned job safety "on their own"			44% injured <1 yr at job; 19% <1 month	
Head Injuries	32% lacked training on "hard hat" use				41% believed no corrective actions
Foot Injuries					>75% not wearing safety shoes when hurt- against policy
Eye Injuries	20% no training on safety eyewear use				20% noted eyewear enforcement only after injury event
Facial Injuries	60% untrained in use of face shields, welding helmets				56% not wearing face shield at time of injury
Injuries from Servicing Jobs	61% untrained in lockout procedures		Lockout training for 32% over 1 yr ago	38% hurt <1 yr at job; 22% <6 months	76% did not know policy on lockout
Lifting/Back Injuries	51% not informed on lifting procedures	95% not informed of lifting aid devices			40% believed no corrective action
Hand/Arm/Finger Injuries-Amputations	59% not informed of protective measures	23-27% uninformed on safety gloves use		10% injured doing work for first time	50% believed no corrective action
Injuries from Oil/Gas Drilling		21% believed training failed to cover injury causing task			15% unaware of hazards
Injuries in Logging Work	51% had no safety training			22% hurt <1 year at job; 13% <6 months	14% unaware of hazards; 15% misjudgments
Injuries from Falls from Elevations	75% received no training in fall protection				22% unaware of fall hazards; 43% need safer job methods
Laborer Injuries in Construction	33% had no safety training; 26% none for task re injury	>75% uninformed on health hazards (asbestos)		74% hurt <1 year at job; 50% <6 months; 12% injured first day	14% noted gaps in hazard awareness; 21% need for safer methods

(Cont'd): **Summary of Possible Gaps in Job Safety/Health Training as Noted in Bureau of Labor Statistics (BLS) Work Injuiry Reports**

Worker Injuries Surveyed	Nature of Limitation				
	Limited Coverage	Content Lacking	Refresher Needs	Inexperience Factor	Policy/Action Lapses
Injuries in Warehousing	48% no safety training; 46% none at task re injury			21% hurt <1 year at job	41% believed no corrective actions
Injuries in Longshoring			Last training for 59% was 3 years ago		Variable enforcement of safety rules
Chemical Burn Injuries	67% uninformed on protective measures				17% unaware of hazards; 12% wrong equipment
Heat Burn Injuries	55% uninformed on protective clothing	19% uninformed on policy re protection		35% hurt <1 year at job; 19% <6 months	25% safer work methods